September 1965

Agriculture

Vol. 72 No. 9

SELECTED CONTENTS

Published for the Ministry of Agriculture, Fisheries and Food by Her Majesty's Stationery Office

1s. 3d.
MONTHLY

OFFICIAL APPOINTMENTS

AGRICULTURAL CHEMIST
ZAMBIA

Required to supervise routine chemical analysis for agricultural purposes and to undertake development or modification of analytical methods with special reference to Foods and Feeding Stuffs.

Candidates must have an Honours degree in Chemistry or Agricultural Chemistry.

Salary scale £1,235—£2,600 a year. 25% gratuity. Passages provided. Education allowances. Quarters available. Three-year contract.

Candidates, who should be nationals of the United Kingdom or the Republic of Ireland, should write for further details, giving full name, qualifications and experience and quoting RC 213/132/010 to:

Appointments Officer,
Room 301,
Ministry of Overseas Development,
Eland House,
Stag Place, Victoria, London S.W.1.

AGRICULTURAL OFFICERS
MALAWI

Required to prepare regional extension programmes and assist subordinate extension workers to carry out these programmes; to be responsible for interpreting research results and for passing the information in a suitable form to extension workers. These vacancies cover several branches of agricultural activities.

Candidates must hold a degree in Agriculture.

Salary scale £1,485—£2,600 a year, plus 15% terminal gratuity. Passages provided. Education allowances. 2 to 3 year contract. Generous leave.

Candidates, who should be nationals of the United Kingdom or the Republic of Ireland, should write for further details, giving full name, and brief particulars of qualifications and experience quoting RC 213/134/09 to:

Appointments Officer,
Room 301,
Ministry of Overseas Development,
Eland House,
Stag Place, London, S.W.1.

PLANT PATHOLOGIST
MALAWI

Required to identify diseases of crop plants and to undertake advisory work on control measures, including some research work into those diseases of major importance.

Candidates should hold an Honours degree in Natural Science with Plant Pathology or Botany as a major subject. Some post graduate work in Plant Pathology is desirable.

Salary: £1,485—£2,600 a year plus 15% terminal gratuity. Passages provided. Education allowances. Government quarters. 2–3 year contract.

Candidates, who should be nationals of the United Kingdom or the Republic of Ireland, should write for further details, giving full name and brief particulars of qualifications and experience, quoting RC 213/134/010 to:

Appointments Officer,
Room 301,
MINISTRY OF OVERSEAS DEVELOPMENT,
Eland House,
Stag Place, London, S.W.1.

AGRICULTURAL OFFICERS
SARAWAK

Required for the administration of an Agricultural Division, comprehensive advisory and supervisory duties and supervision of experiment stations and staff training.

Candidates must hold a degree in Agriculture or Natural Science plus at least two years' experience of tropical Agriculture.

Salary £1,680—£2,905 a year plus terminal gratuity. Passages provided. Accommodation available. Children's allowances. Three year contract. Education allowances. Generous leave.

Candidates who should be nationals of the United Kingdom or the Republic of Ireland, should write for further details, giving full name, and brief particulars of qualifications and experience, quoting RC 213/155/04 to:

Appointments Officer,
Room 301,
MINISTRY OF OVERSEAS DEVELOPMENT,
Eland House,
Stag Place, London, S.W.1.

OFFICIAL APPOINTMENTS *cont.*

AGRICULTURAL CHEMIST
MALAWI

Required to organise and control a fairly large chemical laboratory working on various problems connected with the development of agriculture. Some personal research will be required.

Candidates should hold an Honours degree in Chemistry and a reasonable amount of experience.

Salary scale £1,550—£2,600 a year, plus a 15% terminal gratuity. Passages provided. Education allowances. 2–3 year contract. Government quarters.

Candidates, who should be nationals of the United Kingdom or the Republic of Ireland, should write for further details, giving full name, and brief particulars of qualifications and experience, quoting RC 213/134/06 to:

Appointments Officer,
Room 301,
Ministry of Overseas Development,
Eland House,
Stag Place, London, S.W.1.

Potatoes

The fourth edition of this bulletin presents, as concisely as possible, the essentials of sound practice in potato production, from the choice of suitable varieties to marketing and the economics of production. It also gives up-to-date information on current regulations and data on varieties, yield, seed certification and seed requirements. (Bulletin No. 94.)
8s. (8*s.* 7*d.*)

Bulk Storage of Potatoes in Buildings

Discusses the siting, design and construction of buildings for the storage of potatoes in bulk. Deals also with insulation and ventilation and the questions of mechanical handling and managing the crop from the time it is put into store until it is marketed. (Bulletin No. 173.) **3s. 6d.** (3*s.* 11*d.*)

Published by

Her Majesty's Stationery Office

and obtainable from the Government Bookshops in London (post orders to P.O. Box 569, S.E.1), Edinburgh, Cardiff, Belfast, Manchester. Birmingham and Bristol, or through any bookseller

Agriculture

VOLUME 72 · NUMBER 9 · SEPTEMBER 1965

Editorial Offices
Ministry of Agriculture, Fisheries and Food
Whitehall Place, London S.W.1. Trafalgar 7711

CONTENTS

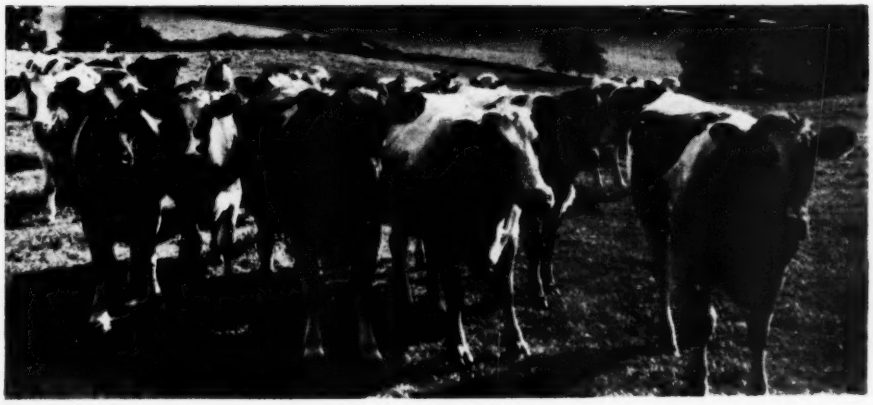
Grassland research apparatus

(as used by Fisons)

This post-box is opposite a bakery. A fact of no importance to Fisons. It is also near a 90-acre Dairy Farm. That *is* important. For Fisons get regular reports through the post. On the stock carried. The milk sales. The fertilizer used.

The point is that grassland farming is a difficult and complex business and Fisons must make a very intensive study of all its aspects so they can give you realistic recommendations. A lot of information comes from experiments at their North Wyke Experimental Station. But that is not enough. Conditions vary from farm to farm; so does farming skill. *Fisons need to know what happens in commercial practice*—what level of concentrate feeding is used; whether this rate increases when more stock are kept; whether grass can supply the extra keep and, if so, how much extra fertilizer farmers find they have to use. Farmers all over the country co-operate. They make regular reports. And Fisons learn some important facts. **Ten per cent of the farmers record a very high level of stocking: one cow (or equivalent) on every 1.2 acres. Without loss of yield. And without undue reliance on concentrates.**

In return for their information, the farmers get a helpful, detailed analysis of their results. And what do *you* get? Turn up any Fisons grassland recommendations and you will find they take account of different levels of stocking. And you can be sure that these recommendations are based not only on experiments but also on the results achieved by commercial farms. The advice Fisons give is practical advice. *It is based on practical experience.*



Nothing but the best is good enough for those Autumn Calvers

PRESENT indications of dairy cow numbers suggest that milk returns to farmers from December onwards might advance beyond last year's levels. This will be little consolation to dairy farmers whose herd yields at that time are seriously impaired because of spoilt hay. But optimum management of autumn calvers now, designed to achieve peak yield potential as soon as possible, can cushion to some extent the effect of inadequate rations in mid-winter.

Milk producers today are rightly very cost-conscious and spectacular economies have been achieved on some farms in the field of food consumption. As a result, 'steaming-up' is now sometimes regarded as a dirty word and dry cows are thought of as useless passengers. This sort of attitude in the case of the autumn calver is false economy.

One would hesitate perhaps to recommend the full Boutflour steaming-up treatment, with concentrates at present prices, but most autumn grass this year looks like being little more than 'lush, slush, mush'—to quote another well-known authority on cow nutrition.

Young leys, provided they have first been grazed bare and then adequately fertilized and rested, may provide a satisfactory stimulus for heifers and cows of low potential which are already in good condition. It should be remembered, however, that a cow's appetite for dry matter, in roughage form, declines rapidly as pregnancy advances.

Cows in moderate or low condition, especially those with high yield potential, will repay with interest an investment in supplementary pre-calving rations during the last six weeks of pregnancy—anything from 1½ to 4 cwt according to individual circumstances and yield potential.

F. J. Willis

Our production of grass compares unfavourably with that in some countries of W. Europe.

'All too frequently farmers with an ample supply of high-quality grazing and/or conserved grass products still persist in feeding expensive concentrates'

Use and Abuse of Our Grassland

A challenging article by V. H. BEYNON

BECAUSE grass covers a major part of the agricultural land in the United Kingdom, success in farming is very much tied up with the way farmers use it. There is strong evidence that production from grass in this country compares unfavourably with production in Western European countries. Even Norway, with its climatic and other natural disadvantages, manages to derive more nutrients per acre from its grass than we do. Judged by Dutch and Danish standards, our performance is distressingly low. True these comparative data relate to the last decade but there is no evidence that the position is markedly different at the moment.

Despite this information, many proponents of grass draw attention to recent achievements in British agriculture arguing that farmers have improved grassland considerably and claiming that this is reflected in substantial increases in livestock production. They use data such as those set out in Table 1 to support this contention.

TABLE 1

Production and Self-sufficiency in Livestock Products: United Kingdom

	Pre-war average*		1953/54		1964/65	
	Index of Production	% Self-sufficiency	Index of Production	% Self-sufficiency	Index of Production	% Self-sufficiency
Liquid milk	100	100	164	100	175	100
Dairy products	100	31	103	40	169	44
Beef and veal	100	49	113	66	149	71
Mutton and lamb	100	36	93	36	135	43
Pork	100	78	136	89	281	98
Bacon and ham	100	29	143	43	140	36
Poultry meat	100	80	125	86	445	98
Total Meat	100	47	118	59	187	67

*Pre-war average 1936/37 — 1938/39 = 100.

Source: Annual Review and Determination of Guarantees, 1965.

Compared with pre-war, liquid milk consumption has increased by over 75 per cent and milk for manufacture by nearly 70 per cent. Apart from occasional months, the United Kingdom has always been self-sufficient in liquid milk, but since 1953/54 it has also been contributing substantially greater quantities to the manufacturing market, with the result that the extent of our self-sufficiency in dairy products has increased from 31 per cent pre-war to nearly 44 per cent at the present time.

Similar increases in production are also evident in meat, the level of production of all meat at the moment being over 87 per cent above pre-war levels. Before the war British agriculture supplied nearly 47 per cent of all meat consumed; the figure is now just over 67 per cent. The country is virtually self-sufficient in pork and poultry meat, but of more significance as far as grassland is concerned, the United Kingdom now produces nearly 71 per cent of its beef and veal (49 per cent pre-war) and nearly 43 per cent of its mutton and lamb (36 per cent pre-war).

Too much concentrate?

These achievements are indeed noteworthy. They would be even more so had they been accomplished entirely from our own grassland. Unfortunately there is strong evidence that British farmers have not only relied heavily on

TABLE 2

Estimated Purchases and Consumption of Concentrated Feed: United Kingdom

	Pre-war	1953/54	1964/65
	million tons		
Home crop production for feed	2·2	6·1	10·0
Balance of farmers' purchases to be met mainly from imported supplies	9·0	5·0	5·8
Total Consumption on Farms	11·2	11·1	15·8

Sources: Supply of Concentrated Feedingstuffs in British Agriculture, by Graham Hallett. (J. agric. Econ. Vol. 13, 1959, pp. 307–19).

Annual Review and Determination of Guarantees 1958 *and* 1965.

home-grown and imported concentrate feed, but have also used a bigger grass acreage and applied more fertilizers. The efforts of British grassland farmers should therefore be considered on the basis of both increased production of livestock products and increased use of various factors.

Supplies of concentrates available to United Kingdom farmers are set out in Table 2. These fluctuated widely during the last war, but by 1953/54 the total had regained pre-war level, largely as a result of efforts on the domestic front. Since 1953/54 the quantities available have reached nearly 16 million tons annually, with about 6 million tons coming in from abroad. It is obvious that imports of concentrates and production of cereals at home have been used in expanding livestock production. A comparison of the grass acreages used in 1953 and 1963, set out in Table 3, shows that in addition to more concentrates, more grass has also been used in recent years.

TABLE 3

Grassland Acres and Stocking: United Kingdom

	1953	1963
	'000 acres	
Lucerne*	109	71
Temporary grass	5,694	6,941
Permanent grass	12,953	12,432
Total	18,756	19,444
Rough grazings adjusted acreages ‡	1,824	1,806
Total equivalent acres of grassland	20,580	21,250
	'000 cow equivalents	
Cattle	7,850·8	8,540·8
Sheep	3,210·6	4,461·0
Total	11,061·4	13,001·8
Acres per cow equivalent	1·86	1·63
Netherlands: acres per cow equivalent	1·34†	1·15

*England and Wales only. †1955.

‡Includes 1,348,000 acres of deer forests in Scotland.

Sources: Agricultural Departments
Landbouwcijfers 1965.

The increased importance of temporary grass and the fall in permanent grass acreage are notable features of this table. Total grassland, measured in terms of equivalent acres, has increased by 670,000 acres. Ruminant livestock measured in terms of cow equivalents have increased by nearly two million over the last ten years. The combined effect of these changes shows that in 1953 United Kingdom farmers devoted 1·86 acres to each cow equivalent, whereas in 1963 the comparable figure was 1·63.

Compared with the Netherlands

This is quite an achievement and has resulted in a better utilization of grass. Compared with the Netherlands, however, our density of stocking still leaves much to be desired. In 1963 Dutch farmers used 1·15 acres of grass per cow equivalent, about ½ acre less than United Kingdom farmers. It is not surprising, therefore, that the wide gap between starch equivalent per acre in

the two countries still persists. The figure for the United Kingdom is still below 16 cwt per acre. This low figure stems directly from the understocking of British farms, and the consequent under-utilization of grass. It is not suggested that the Dutch levels of stocking can be achieved here without difficulty: the Dutch rely almost entirely on permanent grass, which they manure heavily, particularly with nitrogen. Their average dressings are estimated at:

Fertilizer Application on Grass in the Netherlands

	1954/55	1963/64
	lb per acre	
N	71	113
P_2O_5	42	47
K_2O	56	57

Source: Landbouwcijfers 1965.

The data reveal that over the past ten years applications of phosphate and potash have not changed much, but nitrogen applied to grass increased by nearly 60 per cent and is now equivalent to an average of nearly 6 cwt sulphate of ammonia per acre.

Information on the application of fertilizers to grassland in England and Wales is set out in Table 4.

TABLE 4

Fertilizers on Grass in England and Wales

	lb per acre				Area treated %	
	Overall rate		Actual Rate			
	1956/7	1961/2	1956/7	1961/2	1956/7	1961/2
Nitrogen:						
Temporary grass	21	41	44	60	49	69
Permanent grass	10	19	37	49	26	39
Phosphate:						
Temporary grass	27	37	67	66	40	56
Permanent grass	18	25	72	76	25	34
Potash:						
Temporary grass	17	25	56	50	30	49
Permanent grass	8	12	49	44	16	28

Source: Fertilizer Statistics, 1964. *Fertilizer Manufacturers Association Ltd.*

These figures show that between 1956/7 and 1961/2 average dressings of the three nutrients have increased. Nitrogen applications on both temporary and permanent grass have doubled, but in spite of this increase the average rates on temporary grass in the latter years were only a third of the average Dutch application and on permanent grass a mere sixth. The disparity in the application of plant nutrients to grass is also evident for both phosphatic and potassic manures. Information from experimental work on the use of these nutrients is somewhat inadequate, but there is growing confidence on the beneficial effects of nitrogen applied to grass. In 1961/62, however, farmers in England and Wales still restricted nitrogen to 69 per cent of their temporary grass and 39 per cent of their permanent.

It is probable that the higher levels of Utilized Starch Equivalent obtained from grass in the Netherlands is a reflection of the heavier nitrogen application and the heavier rates of stocking. Also the Dutch mow their grass several times during the season, and consequently the acreage mown far exceeds the total acreage of grass. The crop is conserved as hay and silage, and some high-quality dried grass is produced, the latter being used as a production ration during the winter. The practice of mowing the grass several times ensures a regular supply of highly-digestible food.

THE AUTHOR

V. H. Beynon, B.Sc.Agr.Econ. (Wales), is Senior Lecturer in Agricultural Economics at Exeter University. He took his degree at the University College of Wales, Aberystwyth, and was, for a time, an Agricultural Economist there. Before taking up his present appointment, he was Lecturer in Agricultural Economics at Bristol University.

Gross margin factor investigated

In view of the information available on Dutch grassland practices, it would be tempting to advocate an immediate increase in fertilizer application, particularly nitrogen, to U.K. grassland. But, since the profit motive should be uppermost in farming businesses, it is essential to ascertain whether heavier fertilizer applications are themselves likely to raise profits. An analysis of data relating to a sample of dairy farms in the Exeter region has recently been undertaken.* In this, factors associated with gross margins were investigated. The exercise showed that 75 per cent of the variation in gross margins was attributable to stocking, yields per cow, concentrates per acre, fertilizers per acre and price received per gallon of milk. By far the greatest variation was due to stocking rates, followed by yields per cow and concentrates per acre. There was only a weak association between gross margins and fertilizers per acre.

The vital problem to resolve then is how to increase rates of stocking. The data were further analysed to show up factors associated with rates of stocking. It was found that yield per cow, concentrates per acre and fertilizers per acre together accounted for nearly 50 per cent of the variation in stocking rates. Each of this trinity of factors seemed to be equally important, but perhaps more significant was the 50 per cent unexplained variation. This could be due to other factors not included in the analysis, such as variations in soil quality, altitude, climatic conditions and management. It could also be due to the fact that the farms included in the sample were understocked

**The relative importance of certain factors in profitable milk production,* by V. H. Beynon and J. A. Langley, University of Exeter, Report No. 154, June, 1965.

and that a large proportion of the grass was not being utilized. There are strong indications that this is so on many British farms. All too frequently farmers with an ample supply of high-quality grazing and/or conserved grass products still persist in feeding expensive concentrates. This is a criminal waste of resources.

In fairness it would seem that farmers have recently acquired some confidence in the ability of grazing to produce milk, and fewer now resort to hand feeding in the summer months. But they are still bitterly disappointed with production performances from conserved products. There is no denying the fact that few farmers have managed to get even the first gallon from hay and silage during the winter months and many are deeply concerned about the heavy losses of nutrients in the process of conservation. Some have even contemplated restricting conservation to the very minimum and relying on cheap cereals for maintenance and production. New developments in conservation may reinstate the grass crop. Tower silos and vacuum silage packs seem to make the ensiling of young digestible grass a predictable process, with nutrient losses considerably reduced. Obviously there will be teething troubles in these new processes and little is as yet known about the feeding of silage made under vacuum.* These processes hold out distinct promise of a break-through in conservation which would result in a major contribution from grass in the production of milk and livestock products throughout the year.

Every livestock farmer should satisfy himself that his grassland is (a) adequately stocked, (b) given periods of rest between defoliation, (c) fertilized regularly with the appropriate plant nutrients, (d) kept reasonably young by periodic defoliation either by the grazing animal or with the mowing machines, and (e) surplus grass removed for efficient conservation. Most important of all, stocking rates should receive immediate attention, so that grassland can be utilized efficiently.

---

*But see article 'Vacuum Compression Silage' by C. P. van Zeller in the May, 1965, issue of *Agriculture: Ed.*

Egg Production in the U.S.A.

Impressions gained by the author during a visit to the U.S.A. In her first article she considers

- Economics of Size and Scale in the American poultry industry
- Changes which have taken place within that industry

In her second article, next month, Miss Martin deals with the methods of production practised in the U.S.A.

Marion Martin

THERE are many farms in the United States with flocks of 100,000 birds, some with up to 250,000, and one which I visited in Mississippi with one million laying birds. I understand that there is at least one other of this size in California. It remains a fact however that expansions to many millions of birds under the one operator have not so far taken place.

There is ample evidence that economies of size (those economies which result from an increased utilization of existing plant) can be achieved by expansion to optimum capacity, but thereafter further expansion will result in lower returns. For example, an increase in stocking density will result in lower capital cost per bird; the additional stock may then warrant the introduction of more automation, thereby reducing labour costs. Feed costs may be reduced due to the larger quantities required, or because of the possibility of changing from bag to bulk. The actual optimum capacity of any one plant may be increased, for example, by the installation of slats in a deep litter house, or by changing the strain of bird used to one which requires less floor space. All such forms of expansions can lead to marked economies up to that size which is optimum. But if expansion is attempted beyond this point, then the position is reversed and returns will diminish. For example, if stocking density is increased beyond the optimum, mortality will rise and output of eggs per bird will fall, so that although unit production cost per bird may be reduced, declining output will more than offset this, resulting in lower profitability.

Where is the ceiling?

So far as economies of scale (those economies resulting from increases in plant) are concerned, these too exist in the poultry industry. Increased scale leads to increased bargaining power in the purchase of feed, chicks, equipment, etc., and provided expansion is planned so that each new input (including labour and management) is utilized at optimum capacity, there is evidence that continuing economies of scale will be experienced up to a very large number of birds. For example, as bird numbers increase vertical integration becomes economically feasible, both backwards in providing the necessary raw materials and forwards to marketing. Feed is required in sufficiently large quantities to justify the use of a feed mill; the number of pullets required may justify the holding of breeder flocks; when egg throughput reaches a high enough point mechanical handling in the grading and packing of eggs can replace hand labour.

All other things being equal, therefore, and assuming that economies of size are maximized as expansion of scale progresses, and also assuming that each new input is as efficient as the previous one, then the most economical size of an integrated poultry unit in terms of production costs is probably a very large one indeed if full advantages are to be taken of economies of scale. Again assuming that all other things are equal, having once reached optimum size for any one integrated unit, there would theoretically be no reason why a replicate unit should not be established at a completely different site.

From a purely economic standpoint, and in terms of costs of production, the very large, fully-integrated unit is the one best fitted to put eggs on to the market at minimum cost of production. The amount of profit made, however, will depend not only on costs of production, but also upon income received for the product produced. If more and more eggs are being produced as a result of increasing scale of production units, then only if the demand for eggs is completely elastic (i.e., as output increases the market is able to absorb each increment of output at little below the previous price), will each additional dozen eggs produced command the same income. But if there is a less than completely elastic situation, then once demand at any given price has been met each additional output will mean that the income received for all outputs produced is lowered. A point will be reached when profits are maximized, following which it would be more profitable to produce fewer eggs in order to obtain a higher income from them.

Recent changes in the U.S. egg industry have resulted in a situation approaching this with market outlets for eggs rapidly becoming saturated.

Changes in the structure of the industry

Until about 1950 the West North Central region of the States, sometimes called 'the egg basket of America' was producing half of the nation's requirements for eggs and was the only region where production exceeded consumption. It had big advantages in feed cost over other areas in that it is the great centre of the corn production area. Eggs were produced in the main on small units on mixed farms. Owing to the nature of such production methods, supplies of eggs were very seasonal and little attention was paid to quality.

During the 'fifties there was a marked increase in egg production in other areas of the States—in particular in the West and South Atlantic regions. In these areas the human population was growing more quickly

than elsewhere; both were egg-deficit areas providing ready local markets, increased output merely replacing eggs formerly brought in from the mid-west. Also improvements made during the past fifteen years in the inland waterways system linking the grain-producing area of the mid-west to other parts of the country greatly reduced the feed price advantage previously enjoyed by the mid-west. Furthermore, the expansion in egg production in these new areas was mainly by specialist units built up as an investment by their operators who took advantage of the newest technological advances, compared with the more traditional mixed farming units of the mid-west, and the units were large enough to incorporate many of the economies of scale. These newer production methods meant that costs of production were sufficiently low to offset the higher cost of feed, still further reducing the price advantage of the mid-west.

A further incentive to egg production expansion in these areas, and in particular in the South Atlantic states, was the falling profitability of broiler and cotton production. These industries had accustomed farmers to large-scale enterprises, and the specialized services and marketing organizations associated with the broiler industry were easy to adapt to the requirements of the egg industry.

Of the 2,370 farms with flocks larger than 10,000 birds recorded in the 1959 census, 27 per cent were in the Pacific region and 20 per cent in the South Atlantic states. The 1964 census is expected to show a continuation of these trends.

Eggs less in demand

Egg output in the States has remained at a fairly constant level, failing to keep pace with the rising population. But in spite of this egg prices have tended to fall, owing to the reduced demand for eggs. *Per capita* consumption fell from 380 eggs in 1951 to 315 in 1963, and there is no indication that this decline has been checked. In fact, economists are forecasting that there will be a further fall over the next five years of from 5 to 10 per cent. Falling demand is said to be due mainly to the increasing popularity of breakfast cereals in place of eggs, the former being quicker and easier to serve; also eggs are eaten less in the widespread slimming campaigns. There is also more competition from other cheap proteins than previously, and in particular from broiler meat. The result has been that in spite of the increasing population, the States as a whole produced more eggs in 1960/61 than it consumed, compared with an egg deficit in the preceding half century. Up to 1960 the mid-west was the only region with a surplus of eggs, whereas by 1961 the East South Central states and the West were also producing more eggs than they were consuming, and the egg deficits in all other regions except the East North Central and the Mountain regions were being reduced rapidly.

Producer-buyer marketing

During the first half of the century the dominant pattern for the marketing of eggs was sale by producers to local buyers, who in turn sold to other buyers or to wholesalers. As retail stores grew in size and with the development of the large supermarkets (particularly in those areas with large population increases such as the West and South Atlantic states), the demand increased for a more standard product and one of better quality. When the

buyer failed to obtain eggs to his own specifications on the open market where the only eggs available were produced under a wide variety of conditions, he started to by-pass the wholesaler and contract direct with producers for a supply of eggs of a certain grade and quality available evenly throughout the year. Such contracts usually implied price premiums for the producer compared with the non-contract operator, and this again favoured the newer egg operators in the expanding areas at the expense of the older type of producers in the mid-west.

In October, 1964, **Miss M. M. Martin, M.A., F.P.H.,** Assistant to Dr. Blount at the Head Office of The British Oil and Cake Mills Limited, paid a visit to the States with the main object of attending two Nutrition Conferences and to discuss nutritional matters with various University authorities. In addition, however, she was able to visit several large-scale laying units and also to discuss various aspects of large-scale production with economists at Washington.

HILL EWE LAMBS ARE LIKELY TO BE IN BETTER CONDITION AT THE END OF THE WINTER WHEN KEPT IN SHEDS AT HOME INSTEAD OF BEING SENT AWAY

Home Wintering

Welsh Mountain Ewe Lambs

C. P. Scott • A. Harvard

THE traditional method of wintering ewe lambs in many hill areas is to send them away to a lowland farm, but the cost of such a system (*tacking*) is continually rising. In some areas it has shot up from 30*s.* to 45*s.* per lamb over the last three years. Apart from this increase in cost, it is becoming more difficult for hill farmers to find good quality tack, as many lowland farmers are becoming more intensive and no longer want mountain sheep grazing their land during the winter.

Alternative methods of wintering at home include keeping the ewe lambs on specially reseeded land or on crops like kale or swedes. These involve the use of land, usually the better land which could often be used to greater advantage by the breeding flock. Another system would be to confine the animals in a wintering shed with or without outside access to pasture. Such a system has been observed over the past three winters in conjunction with the Liverpool Corporation at their Lake Vyrnwy Estate in Montgomeryshire.

The nutritional requirements of the ewe lamb in her first winter are not fully understood, and estimates of desirable growth rate vary from nil to gains of up to 20 lb for the larger breeds. The important question is what effect does management in the first winter have on subsequent health, lambing percentage, wool clip, tooth wear, age at subsequent drafting and price at drafting. These questions can be answered only by long-term studies, and it is hoped that the work briefly reported here will be continued over a long period.

Sheds save money

The sheds used allow 5½–6 sq. ft per lamb, whose average weight is about 45 lb. Hay is fed in conventional-type hay-racks, with a trough underneath for concentrates. As some lambs are shy feeders, adequate trough space is essential; 10–12 in. per lamb has been found suitable. It may also be desirable to divide the shed into sections so that animals can be grouped and weaker lambs given preferential treatment. The floors are slatted, each slat being 1½ in. deep, 1½ in. wide at the top tapering to 1¼ in., and a ⅝ in. gap between each slat.

The cost of housing is 3*s.* 4*d.* per ewe lamb and has been arrived at as follows:

	£
Total cost of shed	2,300
Hill Farming Grant (50%)	1,150
Net cost	1,150
Interest and sinking fund at 8% per annum	£92
Annual charge per ewe lamb (560 in shed)	3*s.* 4*d.*

Workers in Scotland have shown that ewe lambs can be wintered well in Nissen-type huts with a strawed floor, and as the cost of the slatted floor is approximately one-third of the total cost of housing, an appreciable saving could be made by omitting the slats. No foot or respiratory troubles have been encountered in the three years during which the sheds have been in use.

The ration consists of hay of average quality plus a home-mixed concentrate made up of 5 parts of mixed cereal and 2 parts extracted soya bean meal. A proprietary brand of sheep mineral is included. Trials with sheep involving the use of vitamin D_3 have given conflicting results, and in order to observe any effects under these conditions half the lambs in each group were given a single injection of 500,000 I.U.s of this vitamin. No consistent effects of the vitamin on body weight or lambing percentage have shown up.

In the winter of 1962–63 groups of animals in sheds on different parts of the estate were recorded, but as the quality of the in-bye land and mountain varies, it was thought better to concentrate on one centre. In the past two

The lambs feed from conventional-type hay-racks, with a trough underneath for concentrates

winters observations have been centred on one large shed and a small adjoining converted shippon.

Higher live weight, higher lambing

The 1962–63 winter was exceptionally severe and most of the lambs, whether kept home or away, lost weight. Some of the housed animals went short of water and this had an adverse effect on their performance. Most of the animals had access to the in-bye land and it was notable that one small group of 40 lambs, totally confined in a converted shippon, was the only lot to gain weight during the winter. The animals lambed in 1964, and on average there was no difference in lambing percentage between home- and away-wintered groups. There appeared to be a higher lambing percentage in the small group which had been permanently housed, but wool weights and quality showed no consistent differences.

A closer examination of the lambing figures showed that whereas live weight at the beginning of the winter had little effect on lambing percentage, animals which had made a liveweight gain of over 3 lb during the winter had a higher lambing percentage than animals which had lost weight or only put on up to 3 lb.

A breakdown of the average cost of home wintering gave the following figures:

	s.	*d.*
Hay (@ £13 per ton)	13	1
Concentrate (@ £30 per ton)	5	10
Extra labour at week-ends	5	0
Housing (interest and sinking fund)	3	4
Total	27	3

This cost of 27*s.* 3*d.* (including overtime labour) compared with 33*s.* 6*d.* per lamb for tack (including transport). These figures apply to 1962–63 and on present-day tack costs the saving would seem to be higher at 10–15*s.* per ewe lamb.

Over the past two winters the animals have been grouped in one shed and treated as follows:

HIGH PLANE—1 lb hay plus 4 oz concentrate daily.

LOW PLANE—$\frac{3}{4}$ lb hay plus 2 oz concentrate daily.

One group on each level of feeding has been totally confined to the shed and one group allowed access to the in-bye land. In all, four groups of 80 animals are involved.

It is hoped to obtain a wide range of liveweight gains through the winter so that comparisons can be made. So far, it appears that those animals totally confined make a steadier and greater total liveweight gain over the winter period than animals similarly fed but allowed outside. If subsequent performance justifies total confinement, it will mean that in future the in-bye land could be used to increase the grazing available for the breeding ewe flock.

The information obtained to date indicates that ewe lambs can be wintered at home in sheds and subsequent performance does not suffer compared with that of lambs wintered by the traditional system of tacking. A saving of 10–15*s*. per ewe lamb is possible at present-day costs.

Other advantages of the system are that the ewe lambs are taught to eat hay and concentrates and in a subsequent severe winter will be familiar with these foods. The system is also more flexible than tacking, for if the spring is late and grass is scarce, the animals can be held in the sheds, whereas tack lambs are usually returned to hill farms at this critical time when keep is short and the breeding flock has just lambed.

The authors wish to thank Major E. H. Howard and Mr. David Rowlands of the Liverpool Corporation and Mr. H. E. Roberts, V.I.O., Aberystwyth, for their co-operation in this work.

Clive P. Scott, N.D.A., is a District Advisory Officer in Montgomeryshire. A farmer's son, he did three years' training at Seale-Hayne Agricultural College and a year at the Berkshire Farm Institute, before entering the N.A.A.S.

His co-author, **Arnold Harvard, M.Sc.,** graduated at the University College of Wales, Aberystwyth, and became Research Assistant to the late Professor R. O. Davies in the Department of Agricultural Chemistry there. He joined the N.A.A.S. in 1956, served at Cambridge until 1960, and is now Nutrition Chemist at Trawscoed.

Research Spot

All about fruit

Points from the 1964 Annual Report of East Malling Research Station

selected by

Sylvia Laverton

EARLY performance trials with the Malling-Merton series of apple rootstocks, bred for resistance to woolly aphid, indicated that several were more productive than the older Malling rootstocks. These results emerged from trials made on two contrasting soil types at East Malling. To test whether the new rootstocks' superiority would be maintained at other sites, a number of small-scale trials planned in collaboration with the N.A.A.S. were established in commercial orchards throughout the main English fruit-growing areas during 1953–60. East Malling Research Station's latest annual report includes a summary of the results obtained at twenty-two of the thirty-four sites, where the earlier plantings were made.

The nine rootstocks used in the trials comprised the semi-dwarfing MM. 106, which was compared with the older M. VII; two vigorous members of the new Malling-Merton series, MM. 111 and MM. 104, tested against M. II and M. IV; and the very vigorous new rootstocks MM. 109 and M. XXV, tested against the widely grown M. XVI. M. XXV was raised with the Malling-Merton series, but because it is not fully resistant to woolly aphid it has been numbered in the Malling series.

Each test plot contained four trees of each combination of rootstock and scion. Cox's Orange Pippin and Laxton's Fortune were used as scions in the 1953 plots. The later ones were all planted with Cox and Worcester Pearmain. The records compiled by local N.A.A.S. officers include details of the crops produced and the girth, height and spread of every tree, measured at intervals throughout the test period. Thus they provide quantitative information about the average performance of the rootstocks over a very wide range of conditions.

A plantation of spindlebushes of Laxton's Superb and Fortune on M. 26 at East Malling

Heavier crops from new rootstocks

The results for the first ten years leave no doubt about the superiority of the newer rootstocks. Generally, they gave heavier crops per tree than the older ones of comparable vigour, especially when worked with Cox. The performance of the semi-dwarfing MM. 106 was outstanding. For all three apple varieties and under very diverse conditions, this rootstock produced trees that outcropped those on all the other rootstocks except M. XXV, and all have remained healthy at every site. As MM. 106 makes a tree of only moderate size, it has emerged clearly as the most efficient of all the rootstocks tested, and should be capable of the greatest yield per acre, certainly up to the age of ten years.

Despite the great differences in site quality and soil type, little interaction was observed between rootstock effect and locality, but on poorly-drained sites MM. 104 and MM. 109 were severely affected by waterlogging after the wet winter of 1960–61.

Another new apple rootstock—M. 26 bred at East Malling by Mr. M. H. Tydeman and released to growers in 1959—recently completed a fifteen-year field trial at East Malling, in which it was compared with M. VII and M. II worked with Cox and Egremont Russett. The trees were grown as dwarf bushes with the minimum amount of pruning, and at the end of the trial period, after which no change in relative tree size is likely to occur, the trees on M. 26 were smaller than those of the other two rootstocks, thus offering distinct advantages in easier pruning, spraying and picking.

Promising results have also been obtained with this rootstock in a half-acre plot of Laxton's Superb and Laxton's Fortune, grown as spindle-bushes. This method of apple culture, which is widely used on the Continent, may be of interest to English growers. Although initial labour costs may be a little high—some tying down is necessary in August in the first five years, to shape the bushes—the system provides a large number of small trees per acre, easy to manage because all cultural operations can be done from the ground.

For these spindlebushes the spacing used was 8 ft by 10 ft. By 1964 the Laxton's Superb had filled their allotted space but closer spacing—perhaps even 6 ft by 10 ft—would have been possible for Fortune. Both varieties were cropping freely three years after they were planted, and in 1964 the Superbs produced yields equivalent to 648 bushels per acre, the Fortunes 560. The fruit of both varieties was large, well-coloured and of excellent quality. Posts and wire, which would make a useful framework for tying down the shoots and branches, might have been a more convenient method of support than the single stakes used.

New ideas about pruning

The possibility of reducing pruning costs by doing the job every other year instead of annually is being explored, using mature trees of Cox and Worcester Pearmain. This trial is now in its fifth year. The results so far have demonstrated that a reduction of about 40 per cent in pruning time can be achieved by regulated pruning in alternate years, without any appreciable effect on fruit size.

A trial to determine the effect on fruit size of altering the method of pruning from the regulated system to spur pruning has begun with mature trees of Jonathan. Half the trees are being regulated, as in the preceding sixteen years, the rest have been converted to spur pruning. A change to spur pruning after ten years' renewal pruning has had a beneficial effect on the size of fruit, obtained over a five-year test period, from trees of Tydeman's Early and Worcester Pearmain on M. VII and M. II. Neither the annual crops nor the five-year total was reduced by the more severe pruning method. Experience with Tydeman's Early has shown that light pruning in the early years brings the trees into bearing early and produces good crops, but the growth habit of this variety, which fruits mainly on

Picking Laxtons from seven-year-old spindlebushes

terminal buds at the end of laterals, leads to the formation of many long bare branches. This experiment shows that a change to established spur pruning after the framework of the tree has been formed would give the grower an opportunity to obtain larger fruit from a more manageable tree, though light pruning, by the renewal or regulated system, is likely to give a higher percentage of coloured fruits in the first picking.

New ways with cuttings

For propagating clonal rootstocks, hardwood cuttings are more convenient and economical than stooling or layering. The present method recommended for apple rootstocks entails taking cuttings in autumn, storing them in bins provided with bottom heat to prevent the temperature from falling below 45°F, and planting them out some 8–10 weeks later, when root emergence has begun. The snag about this method is that if unsuitable soil conditions delay planting until late spring, excessive root development is liable to occur in the bins, and when the cuttings are eventually transferred to the nursery, growth and establishment are severely checked.

Recent research at East Malling has shown that the rooting period can be shortened considerably by storing the cuttings at relatively high temperatures. In one experiment, cuttings of the apple rootstock M. 26 rooted in less than two weeks when stored in insulated bins at 75–80°F. It is hoped that eventually this technique will enable cuttings to be lined out for budding in the season following rooting, instead of first growing them for a year in the sheltered environment of a cuttings bed to enhance their chances of survival. However, the relative success of autumn planting may depend largely on favourable soil conditions to encourage root development up to mid-December. Trials are therefore being continued over a number of seasons with cuttings lined out directly in the budding nursery. The ease with which roots are initiated during storage is influenced by the time when the cuttings are taken. This aspect is also receiving further study.

The 1964 Report of the East Malling Research Station can be obtained from The Director, East Malling Research Station, East Malling, Maidstone, Kent, price 17*s.* 6*d.*

Pigs Feature

★ **Dr. A. Eden, M.A., F.R.I.C.,** who contributes a forward-looking article at pages 436–41 on the important subject of *pig nutrition*, needs no introduction to readers. As the senior livestock nutrition specialist in the Eastern Region of the National Agricultural Advisory Service, he is well known up and down the country for his talks to farmers. In our article he presents some of the more salient points in modern thinking and indicates what their outcome may be in terms of practical feeding on the ordinary farm.

★ **Mr. Michael Davidson, M.A. (Cantab.),** contributes at pages 443–9 an interesting article on *pig breeding*. Mr. Davidson farms 200 acres of arable in Bedfordshire and, as a pig breeder, has a 100-sow herd of Large White and Welsh pigs. The herd was taken over from his father in 1953. Selection is based on recording, performance and progeny testing. Mr. Davidson has been a member of the Large White Breed Council since 1957; he is also a N.P.B.A. breed judge, a member of Messrs. Wall's Breeders Committee on Progeny Testing, and a member of the Agricultural Research Council's Technical Committee on Pig Research. He has studied pig keeping in Belgium, Denmark, Holland, Canada, U.S.A. and New Zealand.

A. Eden

Some Recent Trends in Pig Nutrition

WITH the undeviating public demand for lean meat, the economic value of a pig carcass is determined both by its weight and by the proportions and distribution of lean meat and fat. Nutritional research is therefore concerned with diets and feeding systems that get the best rate of growth for the lowest food consumption and with carcass appraisal.

What is the best for one factor is not necessarily so for another. Moreover, feeding regimes and nutritive requirements have to be defined in the light of ever-changing standards of performances which are in turn closely linked with genetic, environmental and health factors. Much of the older work in pig nutrition has lost a great deal of its significance by its lack of connection with the important factor of desirable carcass conformation.

Consumer acceptance of the carcass involves factors of lean meat content and distribution, texture and flavour—with the greatest emphasis on lean meat. Determinations of the latter normally involve time-consuming and tedious dissection, although much is now being done to correlate lean meat content and its distribution with linear carcass measurements, specific gravity and (more recently) ultra-sonic determinations. Chemical assessments of the deposition of meat protein can be made by accurately conducted nitrogen balances in the living animal, but they require supplementary confirmation of lean meat content by non-chemical means. In short, nutritional research today, to be of practical significance, has to be closely linked with carcass appraisal.

The energy content of British pig diets is fairly closely circumscribed by the use of barley, wheat and cereal by-products as the major components. Some work has been carried out with higher energy diets based on the use of stabilized fats, but on grounds of economics and carcass conformation cereals are likely to remain the main energy sources. Although knowledge is still far from being quantitatively exact, the requirements for most minerals and the more important vitamins are fairly well defined. Consequently much of the current nutritional research is concerned with closer definition of protein requirements of the pig at different stages of its life, especially in

respect of the amino-acids as components of the protein. Of the eighteen or so amino-acids normally associated with pig diets, some nine or ten are essential in the sense that they must be present in the food in at least minimal levels; of these, lysine and methionine occupy the major attention of investigators. Synthetic amino-acids are now becoming available more economically, and they have assisted the nutritionist in defining more accurately the needs of pigs at various growth stages; eventually their availability should make the pig producer less dependent than formerly on empirical and traditional sources of protein.

The greatest attention is being devoted to the amino-acid lysine, since this amino-acid can be rendered partly or completely unavailable by careless methods of processing high-protein foods. Modern chemical techniques of determining available lysine content are playing an ever-increasing role in the work of defining lysine requirements. Now that the amino-acid make-up of proteins can be established more quickly and accurately, increased attention is being paid to their complex interrelationships and nutritional interactions with other components of the dietary. The need to define more accurately the optimum levels in the diet is exemplified by some recent indications that an excess of lysine may have almost as deleterious an effect on growth performance as a sub-optimal level.

Nutritional research today is also taking greater cognizance of the effects of environment and the need for more careful control of disease. Commercial performance expectations are constantly being raised. A few years ago producers were satisfied with pigs that attained bacon weight (200 lb) in an average of 190 days of age and with a food conversion from weaning of about 3·4; today, in the controlled environments of Pig Progeny Testing Stations, Large Whites reach bacon weight at an average of 167 days and have a food conversion ratio of less than 3·0. Some of this improvement is undoubtedly genetic; but without adequate nutrition and control of environment and disease, pigs could not fully express their genetic potential.

Stimulating growth

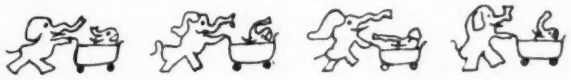
Search continues for growth stimulants to enhance an already nutritionally adequate diet. Of these, the antibiotics (principally penicillin and the tetracyclines) used at levels of 5 to 15 p.p.m. held pride of place until the discovery of the value of supplementary copper (as the sulphate) at levels of 250 p.p.m. in the diet. Copper is more consistent in its growth-promoting effects and has become a reference standard by which other growth-stimulants are compared. Risks of copper toxicity are small, provided this maximum level is not exceeded. Copper appears less effective when added to low-protein diets, further illustrating the complex interactions between the various components of the diet.

An interesting comparison has been made of a typical U.S.A. diet, based on maize and soya bean meal, with a typical British diet, based on barley and fish meal, with groups of pigs fed both *ad lib.* and to an agreed scale in Ohio and in Reading. In terms of growth rate and food conversion the higher-energy U.S. diets were slightly superior, but they were decidedly inferior in respect of carcass conformation, especially with *ad lib.* feeding. Such trials stress the need for carcass appraisals in nutritional experiments.

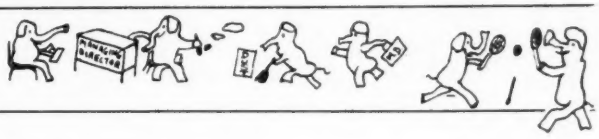
The physical form in which food is given is also commanding attention. Old questions such as wet *v.* dry feeding are being re-examined, and recently

Charles Darwin calculated

that, if elephants were allowed to breed unchecked,



in 750 years the world would be full of elephants.



This worried him—

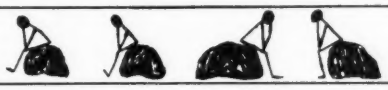
So he evolved the Theory of Natural Selection, showing how the elephant is kept in check by its natural enemies.

Our backroom boys have calculated (by digital computation)

that, if nutritional research proliferates unchecked,

within 25 years the world will be full of books on nutrition.

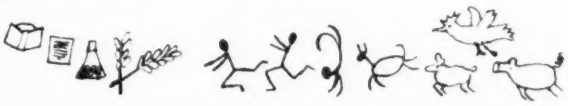
This worries us—



especially as the natural enemies of the book seem to be losing out.

The people who *don't* have to worry about this are the farmers (all round the world)

because all this knowledge (as well as forty years' practical experience)



goes into

VITAMEALO

Issued in the interests of Scientific & Practical Nutrition by
VITAMINS LIMITED (VITAMEALO DIVISION) UPPER MALL, LONDON W6
Write for further information concerning Vitamealo Concentrates

there have been indications that food given in pellet form may be used more efficiently than as meal. The importance of this lies in the increasing practice of floor feeding of pigs with its consequent effects on housing design and heavier density of pig population. Dry meal feeding leads to much dustiness and often a considerable amount of respiratory troubles in densely-populated pig houses, and probably physical losses of food are considerable. The seeming advantages of pellet feeding need more thorough investigation.

It is estimated that at least one pig in five dies in the first eight weeks of life, and a high proportion of these losses is attributable to piglet anaemia. The iron content of sow's milk is notoriously low, and the use of ferrous fumarate in the sows' diet has been claimed to raise this content and to help control anaemia. Such claims have not been confirmed consistently and investigations continue.

A few years ago there was considerable interest in dietary formulations for very early weaned pigs and in the provision of artificial milk substitutes. This interest subsequently declined, possibly because of disease build-up and subsequent impaired sow performances. Developments in the production of pathogen-free and minimal-disease pigs have re-stimulated investigations into the feeding of neo-natal pigs, both by liquid and solid foods.

The sow in pregnancy

Until recently the nutrition of the pregnant sow was a neglected field of study. Sows were usually generously fed during pregnancy to gain in bodily condition, which was subsequently lost during the ensuing nursing period of eight weeks. Energetically this was an uneconomic procedure, and more recently work has focused on the effects of a low plane of nutrition during pregnancy followed by a high plane to stimulate milk production during the suckling period. It is now established that 4 lb daily of a properly balanced meal during pregnancy has little or no adverse effect on the numbers of piglets born or on the average birth weight, nor has the plane of nutrition during pregnancy much influence on subsequent lactation performance. The plane of feeding of the lactating sow, however, has a tremendous influence on milk production and hence on the early growth performance of the litter before they seriously take to solid foods. Although crude protein levels without reference to the make-up of the protein are an inadequate measure of the efficiency of a nursing sow's diet, it seems that a 17 per cent level, of which one-half is derived from animal protein sources, is perfectly adequate.

One important consequence of the lower plane of feeding the sow during pregnancy is the need to ensure an adequate intake of minerals and vitamins, and hence the level of these in the diet has to be increased to compensate for the lower food intake. The studies on the pregnant and lactating sow have also advanced our knowledge of the quantity and quality of the milk produced, and the well-accepted practice of creep feeding young pigs has assisted with policies of earlier weaning than the traditional eight weeks, thus enabling the sow to be put to the boar again sooner.

Although there are many problems in pig nutrition still to be solved, including the important one of leg weakness in growing and in breeding stock, the tremendous rate at which knowledge has advanced during the past few years is excellent testimony to the appreciation by our research workers of the practical problems of the industry.

Michael Davidson

The Role of the Pure-Bred Pig Breeder

PEDIGREE breeds of pigs, together with the appropriate societies to look after their interests, have only been in existence for sixty or seventy years, and so one is tempted to ask—what is a pedigree pig and how does it differ from any other pig? A pedigree pig is, in fact, an animal whose ancestry can be traced back for several generations, but is often thought automatically to be a pure-bred pig. It is the pure-bred pig which is of such vital importance to the pig industry, although, as I shall point out later, the ultimate aim must be for commercial pig production to come from the crossing of top quality pure-bred lines.

The evolution of pure breeds of pigs as we know them today is very interesting. Broad general types of pig developed naturally in different regions to satisfy the most pressing need of that region. For instance, the need might be for low maintenance cost, good grazing ability, and hundred per cent weatherproofing in areas of low population and high rainfall. On the other hand, a different type evolved to meet the need for lard and pig meat for the ever-expanding industrial towns; this type was prolific and fast-growing, happy in intensive conditions, and produced the type of pig meat required at the time. These broad general types can still be clearly seen today, and in large measure represent the major differences between the breeds of today.

Effort diverted

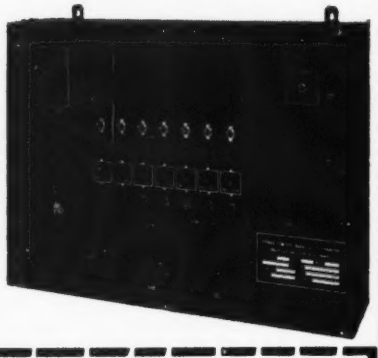
When our forefathers went to buy animals, they had to rely almost entirely on what they could see by looking at the animal at that particular time. Now

HYDOR

FANS FOR AGRICULTURE

- Rust-proof all alloy casing, propellor and ring.
- Low noise level.
- Switched reverse.
- Ideal in conjunction with oil-fired blowers.

Few farmers to-day would deny the value of ventilation in pig, poultry and beef houses, yet many still believe it to be a costly installation. The HYDOR ready wired system is the answer. Just secure the fan, place the control panel in position, push the two halves of the connector together and secure the panel ends. Nothing could be simpler or less inconvenient.



For expert advice and service in agricultural ventilation contact

POST THIS COUPON NOW

HYDOR COMPANY Ltd.

THE HYDOR Co. Ltd.

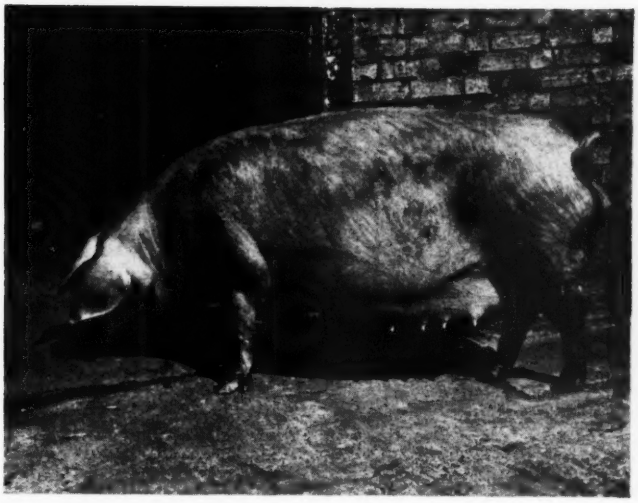
BOTLEY ROAD,
NORTH BADDESLEY,
SOUTHAMPTON

Please send full details of HYDOR fans

NAME .....

ADDRESS .....

.....



The author's pedigree Welsh gilt 'Wiseacre Well-to-Do 114th'

it is true, of course, that a great deal can be observed in this way, particularly if the observer is well practised in the art. Good physique and development for age are readily apparent, as are temperament and sound health. On the other hand, human nature being what it is, things are not always what they seem! Where personal profit and prestige can readily be gained by presenting stock for show or sale with a very pleasing appearance, the efforts of the breeder can soon be diverted away from the fundamentally important goal of breeding better stock, and directed towards producing better-looking animals.

This, in fact, is what happened in general during the first half of this century. Pigs which were successful in the show ring were bought for high prices by progressive farmers; but under commercial conditions they failed to show the economically important characteristics of fertility, thriftiness, growth, and carcass quality. Many farmers reverted to producing cross-bred pigs without regard to the quality of the parents; although the resulting pigs were often inferior in type to the pure-breds, the toughness and fertility of the cross-bred meant farming without tears and the farmers slept better at night as a result. Also, during the Second World War and after, severe shortages of meat and other complicated causes resulted in high prices for all pigs, regardless of quality. This disillusionment amongst many farmers with the use of pure-bred pigs is totally against the interests of the pig industry as a whole; without ever-improving pure-bred pigs, no progress is possible. Other countries are always trying to improve their breeds, and competition is such that we must improve also in order to maintain or better our standard of living.

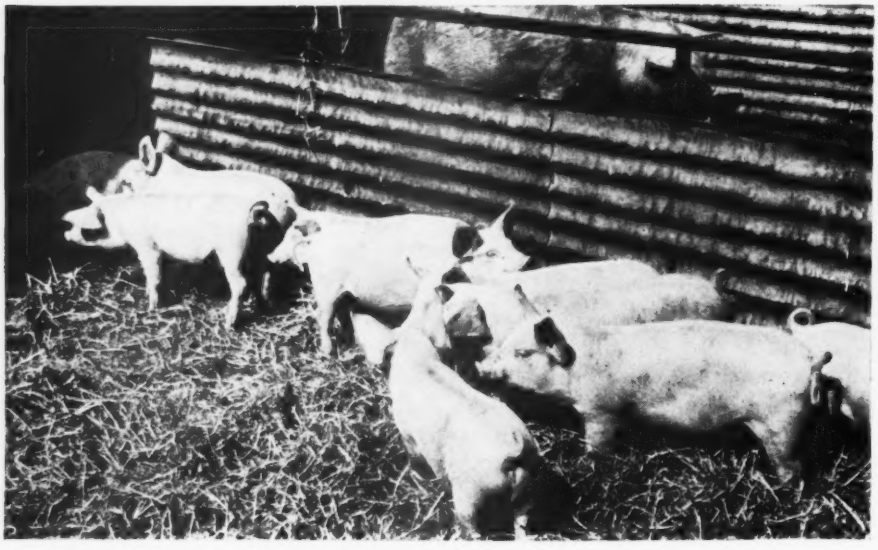
Obviously, therefore, the pure-bred must not only be improved in itself, but it must also make more money for the commercial farmer, and without that commercial farmer necessarily having as high a degree of skill and experience as the breeder himself. In these days of labour shortage and large pig units, the breeder must produce pigs which can cope with these conditions. How is he to do this? Showing of pigs has been abused by some breeders, and there are many people today who therefore suggest abolishing shows. I am not one of these. There is no substitute for observation and learning to know

your stock when it comes to breeding animals. A complete swing away from any form of visual inspection would do much harm, through encouraging the production of pigs with defective conformation. I believe, however, that no stock should be shown without reaching minimum standards of performance.

The way to improvement

The main work of pig improvement, however, must always be done on performance within the breeders' herds, using pure breeds. National testing stations for performance and progeny testing provide a measure of checking for comparing strains of pigs under controlled conditions, but they can never hope to provide adequate facilities for testing the whole of a breeder's herd. The basic principle of improvement within a herd should be to select a reasonable number of areas of performance and maintain a minimum standard for *all* these characteristics, while using exceptionally good individuals for specific purposes in the breeding programme. In other words, all the breeding stock selected for use in the herd must have achieved a good minimum standard in all the selected areas of performance; a few of these animals will be outstanding also in one aspect. Suppose that all breeding pigs are selected from litters of at least eight pigs reared, weighing at least 110 lb at three weeks, and that, say, two pigs in each litter reach top carcass grade in 180 days at bacon weight. Some litters achieving this standard will average only 160 days to reach bacon weight; other litters may average 155 lb at three weeks, or never rear less than 11 pigs per litter. Where these exceptional characteristics emerge, these lines can be used to excellent effect for correcting deficiencies in other lines. Breeding from extremes is a waste of time unless the extreme animal also carries a background of good all-round performance. A man once boasted that he was going to breed a wonder dog that would fight like a bulldog and run like a greyhound; so he mated a bulldog with a greyhound. Unfortunately the resultant dog ran like a bulldog and fought like a greyhound!

A newly-weaned litter by a Large White boar out of a Welsh × Large White gilt on the author's farm

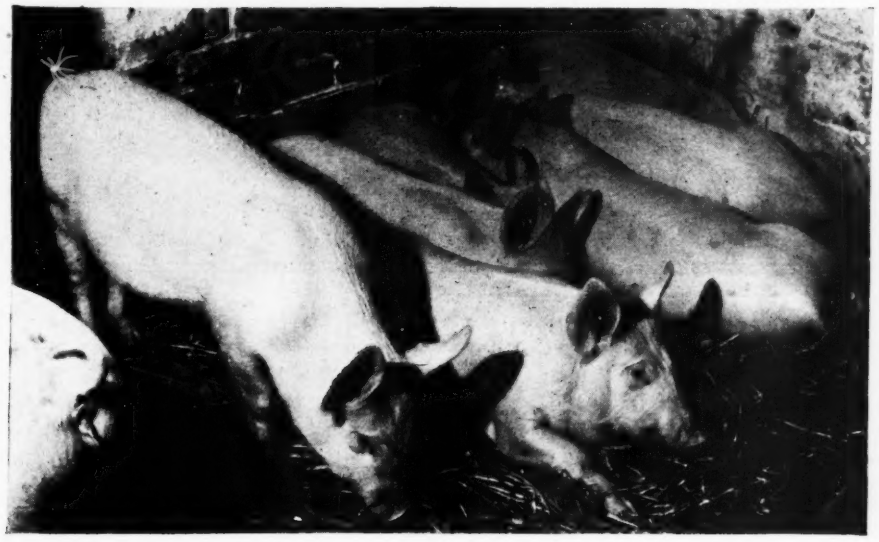


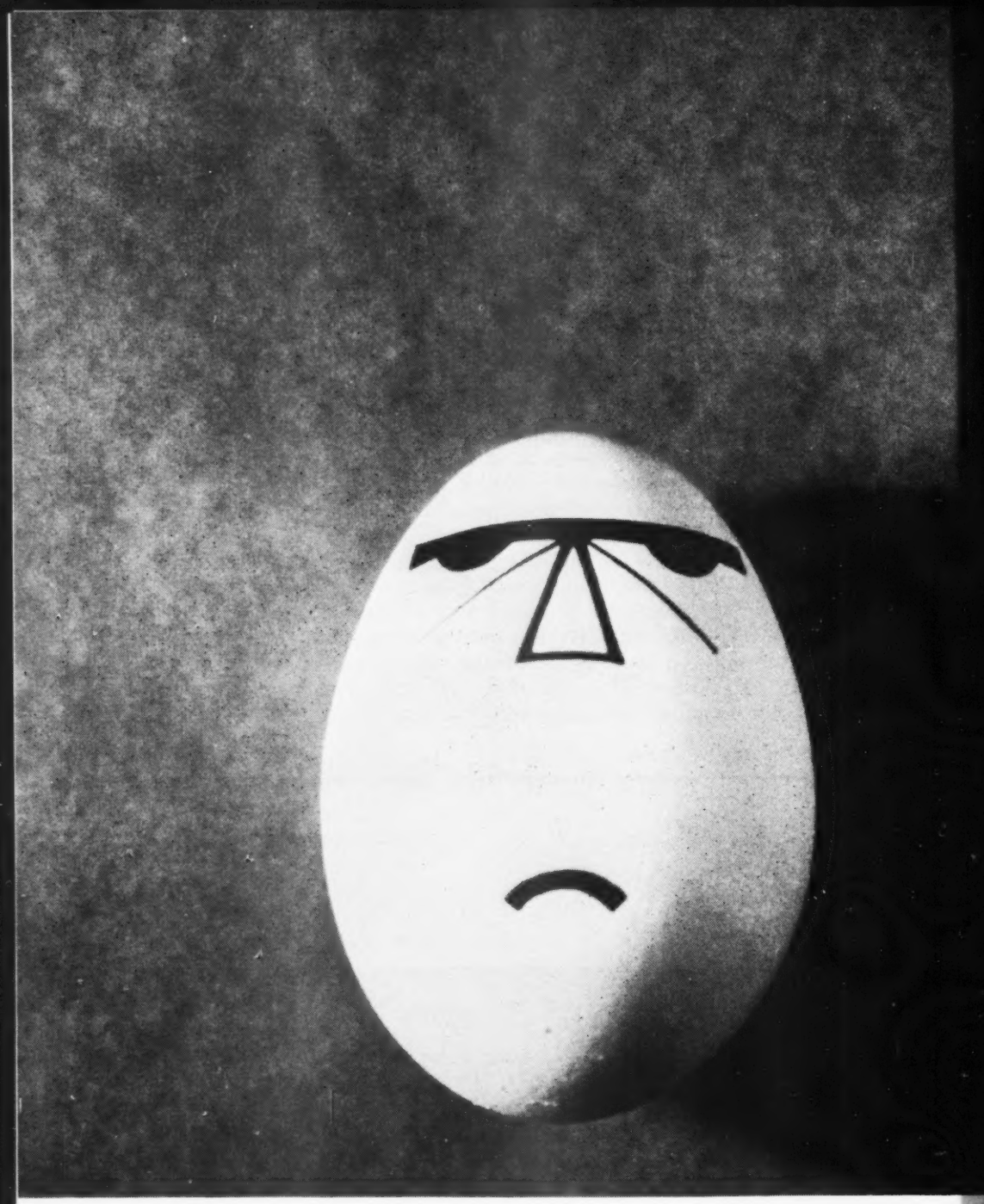
Cross-breeding

There is no doubt that cross-bred pigs are, on average, tougher and more productive than pure-breds. The only exception to this rule is that under conditions which are good enough to give really good results with pure-breds, cross-breds will do no better. This, in my view, explains those carefully prepared statistics which one sees from time to time, which show that there is no difference in performance. The vast majority of cross-bred pigs produced in this country, however, are produced without a high standard of selection being applied to the parent stock. The tendency has been to say that any old pig will do for crossing—and there is a certain amount of reaction in this away from pure-bred pigs. But the truth is that the best bet for the commercial pig farmer today is to use top performance pure-bred pigs from two or more good breeds. He then gets all the advantages of the cross-bred pig, together with the quality of carcass, food conversion and so on, that only comes from methodical, progressive selection.

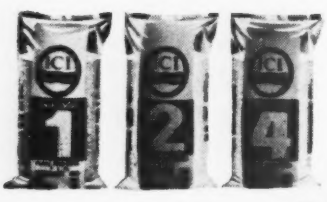
Summing up, conventional methods of pig selection, although successful in the past, are not accurate enough for the rate of improvement in pure-bred pigs which is required today. Comprehensive records of performance for all the pigs in a herd are the only sound basis for selection, and a basic standard of all-round performance must be maintained. Finally, the best results in modern, highly-intensive pig units, can only be obtained by crossing well-selected pigs from two or more suitable breeds. In my opinion, these changes are bound to come, and all those concerned with pig breeding and production generally would do well to make allowances for these factors in their plans.

A contented litter of Large Whites





we're looking for a hard-boiled egg with a soft spot for a bargain



In short, you. The farmer who costs crops carefully, knows it pays to get fertilizers on early delivery rebate. Knows how concentration—ICI concentration—saves even more. Cuts handling and carting costs. Speeds up application time (free-flowing as well as concentrated). Takes up less storage space. And ICI concentrated compounds, packed in polythene, can be stored under any kind of roof. For the best bargain in fertilizers, order ICI concentrated compounds from your merchant now.

ICI

BAGS OF FARMING EXPERIENCE

A five-year research into meat marketing is being carried out by the Department of Agricultural Marketing of the University of Newcastle upon Tyne, under the sponsorship of F.M.C. (Meat) Ltd. and the Agricultural Market Development Executive Committee. Here are the first results

Beef over the Counter

E. M. CARPENTER and G. H. BRAYSHAW

THE investigation into beef retailing which forms part of the meat marketing research which Newcastle University is undertaking has three main objectives: to appraise the relative importance of different criteria by which consumers judge the quality of beef; to obtain some indication of types of beef sold in areas where consumer acceptance studies have since been undertaken; and to obtain general information on meat retailing, including consumer buying habits, pricing, cutting and procurement of supplies.

Butchers considered that leanness was the characteristic of first importance in consumers' estimates of quality, tenderness second and flavour third. They almost disregarded marbling, ageing and other criteria in the list from which they chose. However, when consumers' favourable comments on beef subsequent to purchase were considered, flavour was mentioned by about 50 per cent of the butchers, while leanness was quoted by only about 12 per cent. It is impossible to question the importance of tenderness to consumers' estimates of quality. Butchers attach almost equal significance to leanness. Whether in fact their customers do so is less certain; they appear to regard leanness as being very important when they buy, but less so on eating. Consumers can, of course, make certain of buying lean beef and therefore might not consider this characteristic later. Nevertheless, evidence from consumer tests in the same cities suggests that, on eating, steaks with a considerable amount of fat are acceptable, if satisfactory in other respects.

Flavour may not be much less important than leanness in many consumer estimates of quality. Certainly it cannot be left out of account in any attempts to define quality likely to be acceptable to the mass market. It was not possible to draw firm conclusions about colour, but there is informal evidence to suggest that this also is an important characteristic at the time of purchase.

Varied uses of primary cuts

A wide variety of culinary uses for all or part of many primary cuts was noted. Thus topside was not uncommonly used either for roasts or frying steaks, and chuck might be used for frying as well as for stews or mince. Uses varied between butchers and between cities. Few butchers believed that many of their customers knew the anatomical origin or the special characteristics of many of the varied cuts. Taking all cities together, less than half the customers asked for particular cuts by name when buying roasts or frying steak and less than a third when buying beef for stews. In four out of the five cities topside or silverside were given as the most popular roasts, sirloin came next, and third choice was usually fore chine ribs. For frying steaks, the usual order of preference was fillet, then rump, followed by a variety of other cuts. Because many consumers are unaware of the attributes of particular cuts, it may be realistic to sell beef as first, second or third quality and according to its culinary uses, rather than under traditional names.

From a third to half the butchers stated that proportionately more of the carcass is now sold for frying than five years ago, and only slightly fewer held that the same was true for mince. They were less clear about the trend for roasts and stews.

For the vast majority of butchers there was no clear relationship between the degree of finish of carcasses procured and their general belief that the consumer requires lean meat. Medium finished sides were as often bought as those described of light finish. This also may suggest that leanness is less important to consumers than most butchers suggested. Alternatively, this could be due to lower prices for over-fat carcasses, a connection between conformation and fatness, better eating quality from medium as opposed to lightly finished sides, or a failure of the market to make its requirements known to producers.

Butchers' estimates of the most common weight of side purchased were clear—from 271 to 310 lb; but many were uncertain of the age of animal from which these were obtained. Furthermore, they tended to underestimate the age of animal from which carcasses were obtained, this being an example of imperfect spread of knowledge between producer and retailer. Butchers' requirements in this respect, therefore, can only be transmitted to producers indirectly.

Wholesale trade gives a good service

A considerable proportion of supplies in Liverpool and London were obtained as wholesale cuts, and in other cities these amounted to about a quarter of total procurement. The hindquarter cuts most in demand were tops and rumps. Shins and ribs were most often bought among forequarter cuts. This widespread procurement of at least part of supplies in wholesale cuts shows that the wholesale trade offers a considerable service, enabling the retailer to make flexible purchases. This must contribute to efficiency in the meat market.

Regional differences in cutting were less noticeable than expected. Nevertheless some variation in primary cutting and in presentation for the customer, as well as the culinary uses of different cuts, was commonly found both between butchers and cities. Differences between cities appeared to be well adapted to meeting regional differences in demand for roasts, steaks and stews.

Prices of steaks, joints and stewing beef varied considerably between cities, and between shops for similar cuts. In Liverpool all prices, except for brisket, were lower than elsewhere. In London high-quality frying steaks sold for more than in any other city, and the highest prices for sirloin and fore chine ribs were found in Glasgow. In general, prices in low-income areas were below those in other districts, but the price differential between high and low quality cuts was virtually the same in both districts.

Finally, since many butchers easily equated supply of different cuts with demand, without varying their prices, and because individual prices for the same joints varied considerably, it is argued that they may have competed as much by service as on price.

Many readers may be interested to read the report, *Butchers and their Customers*, which the University of Newcastle has published recently. It is based on an interim survey of 446 specialist butchers' shops, co-operative meat departments and supermarkets in Birmingham, Glasgow, Liverpool, London and Newcastle upon Tyne.

Price 15*s*.
from the University.

C. A. WAGSTAFF

SONIA KURTA

B. G. JACKSON

Three Suffolk farms are costed to show profit from sheep and beef kept on

Grass in an Arable Area

IN a highly productive arable county such as Suffolk, the economic potential of a livestock enterprise must be of a high standard if it is to survive. Many farmers still consider that the need to maintain balanced farming is an all-important factor, and in these days of high output with low costs the problem of maintaining efficient livestock enterprises on these arable farms is a very real one. We must, therefore, look to intensification as being major to their success.

For many years it has been difficult to substantiate the value of the 'Golden Hoof' of the sheep on our arable farms, particularly comparing the financial return with that of corn growing and even other forms of livestock production. Recently, however, it has been shown that when sheep are skilfully blended into an arable rotation, economically fed on by-products and cheaply housed to avoid serious poaching of the land, the returns can be favourably compared with both barley and wheat. It is also a means of utilizing labour during the off-peak periods of the year.

In East Suffolk we have two examples of successful sheep enterprises, both on medium to heavy land, which have been costed over a period of twelve months.

Farm A: Flying flock

The first (we will call it Farm A) carried a flying flock of 417 cast ewes, mainly Kerry Hill and half-bred crosses, which was bought, together with 12 rams, at an average of £4 a head.

The ewes were flushed on a 22-acre catchcrop of Italian ryegrass. They were mated from 25th August, with the aid of light control, and brought into sheds at the farmstead in the late afternoon and returned to pasture after sunset. They were injected twice against pulpy kidney and lamb dysentery and put through a foot-bath once a week. The flock was maintained until 13th December on 40 acres of herbage seed stubbles previously irrigated for rapid growth of shed seed, together with the catchcrop of Italian ryegrass. Grazing continued until 13th January on 28 acres of S. 37 cocksfoot seed stubble, supplemented by short periods of folding on sugar beet tops. The flock was then brought into two open pole-barn turkey pens, vacated at Christmas, and bedded on straw, there being little restriction on floor area per ewe. Lambing began on 22nd January.

Indoor feeding consisted of pea haulm silage and hay from racks placed on a central concrete approach to the turkey pens. In view of the poor condition of some of the ewes, additional concentrate feeding was necessary. The ewes consumed up to a maximum of 11 lb per head per day of silage and 2 lb of concentrates which was introduced out of doors at the rate of $1\frac{1}{2}$ lb and $\frac{1}{4}$ lb per head per day respectively. Creep feeding of the lambs commenced on 6th February. Despite regular treatment, foot troubles were found to build up, due to puddling around the uncovered silage feeding area, but this has since been avoided by keeping the flock entirely under cover on clean straw.

Outdoor grazing started again from 4th April on 28 acres of S.22 ryegrass with supplementary feeding of silage and creep feed for the lambs, and continued with a further 24 acres of similar grazing until 12th May, when both fields were closed in readiness for a seed crop. Grazing from mid-May onwards was on 90 acres of unploughable meadow land shared also by the dairy herd. The total quantity of supplementary feed per ewe and litter averaged $8\frac{1}{2}$ cwt of silage, $2\frac{1}{2}$ cwt concentrates and $\frac{3}{4}$ cwt of hay.

The first 35 fat lambs were drawn on 1st May at an average live weight of 74 lb and realized £8 each. These were followed by regular weekly batches up to the end of June. The lambing percentage based on ewes tupped and lambs sold was 134.

In drawing up the following costings, it was assumed that the flock was a supplementary enterprise making use of resources such as pea haulm silage, herbage seed stubbles and buildings already on the farm. No charge was therefore made unless there was some extra expenditure specifically for the sheep. Thus the gross margin figure represents the addition to total farm income attributable to the flock.

Farm A: Input-Output Data, 22nd August, 1963, –21st August, 1964

Costs	£ s.	*Returns*	£ s.	£ s.
Valuation change—breeding flock	1,236 0	Lambs:		
Concentrates–54·1 tons	1,422 16	536 sold	3,351 0	
Hay (purchased)	166 8	21 on hand	126 0	
Grazing–extra costs for sheep	445 0			3,477 0
Haulage and marketing	149 5			
Miscellaneous	156 5	Breeding flock:		
		Sales : 231 ewes, 9 rams		1,404 9
GROSS MARGIN	1,509 19	Wool: 149 fleeces		204 4
	5,085 13			5,085 13

A gross margin of £3 12*s.* per ewe was realized. It was difficult to assess the acreage chargeable to the flock as so much was grown for seed or a catchcrop. However, this was calculated to be 36½ acres, representing a gross margin of £41 per acre.

Farm B: Self-contained flocks

Farm B carried two self-contained flocks of 110 Kerry Hill × Suffolk and 33 pedigree recorded Dorset Down ewes which were mated on 24th July and 10th August respectively to Dorset Down rams.

The flocks were maintained on leys, stubbles and unploughable grassland, for varying short periods with no supplementary feeding until five weeks before lambing. They were then brought into existing covered yard accommodation at the farmstead, bedded on straw, again with little restriction on floor area, and fed on hay *ad lib.*, purchased mangels, and supplemented with a coarse ewe and lamb concentrate ration to a maximum of ½ lb per ewe per day.

Lambing started with the crossbred ewes on 21st December, followed by the pedigree ewes after the first week in January. The ewes lambed in the yards in pens constructed with hurdles, creeps being provided for the lambs in which concentrate pellets and hay were available *ad lib.* from one week of age. A water supply was laid on in the yards.

The pedigree lambs were the quicker maturing and were drawn from 6th April, followed by the crossbreds a week later. The crossbred ewes, however, were more prolific; they produced a lambing percentage of 188, compared with 124 from the pedigree ewes. Based on ewes tupped and lambs sold or retained, the combined percentage for the two flocks was 173.

When drawing up the costings for Farm B, the home-grown hay was charged at its variable cost of production and the acreage included an allowance for this hay.

Farm B: Input-Output Data, 10th August, 1963, –9th August, 1964

Costs	£ s.	*Returns*	£ s.	£ s.
Concentrates	433 3	Lambs:		
Mangels–35 tons @ £3 10*s.*	122 10	196 sold	1,530 0	
Hay–variable costs only	56 18	52 retained	390 0	
Grazing–variable costs only	45 11			
Miscellaneous including shearing	77 19	Other sales:		1,920 0
Valuation change—breeding flock	162 10	Cull ewes	119 15	
		Wool	337 0	
GROSS MARGIN	1,478 4			456 15
	2,376 15			2,376 15

Acreage chargeable to sheep (including allowance for hay) = 42

Gross margin per acre £35

The gross margin of £9 per ewe was a reflection of the higher lambing percentage, economy in feeding and the increased revenue from the sale of pedigree ram lambs.

Farm C : Single-suckled beef

Farm C comprises 400 acres of heavy land in N.E. Suffolk which carries a semi-intensive beef unit producing finished cattle at 15 months of age.

Faced with the problem of calf supply, which is a continual threat to the economic viability of both intensive and semi-intensive beef enterprises, the producer began to search around for alternative methods of obtaining stores for yarding.

He was fortunate in finding a retired businessman and part-time farmer who was prepared to turn over to him, on a rental basis, a single-suckling herd of 150 crossbred Hereford and Aberdeen-Angus × Friesian cows with 210 acres of good parkland. Sixty acres of this had been reseeded with a perennial ryegrass, timothy and meadow fescue mixture. A water supply was laid on.

At this stage the National Agricultural Advisory Service was called in to advise. Alternative schemes were suggested whereby this herd could be rented from the landlord, and agreement was finally reached at a rental of £6 per acre for the land and buildings, plus a 5 per cent capital charge per year on the livestock and machinery. The tenant was to provide his own herd replacements. Fifteen acres of marshland were also rented under a separate agreement and carried 16 in-calf heifers owned by the tenant. As a check on the financial success of this venture, the enterprise was costed.

The herd calved outside in the park from the beginning of October and wintered in a corral constructed by the landlord in the centre of a wood. The construction was of rough timber and consisted of racks and feeding troughs with a concrete apron around the outside. Both cows and their calves could lie under cover, and the calves were able to pass through to the creep area for supplementary concentrate feeding. Winter feeding consisted of pea haulm silage and oat straw, plus a concentrate mixture of crushed barley, sugar beet pulp, dried grains and ground-nut cake. Grazing resumed in March with creep feed provided in sheltered areas for the calves. The existing fencing divided the park into paddocks of 7–30 acres, and use was made of these to adopt a rotational grazing system.

From a total of 166 breeding cows and heifers, 160 weaned calves were produced, of which 14 heifers were sold fat off the grass. The remaining 146 calves averaged 6¼ cwt at the end of September for finishing in the yard.

The labour taken over by the tenant consisted of two men who were each paid £12 per week, plus a bonus on each calf reared.

The costings for the twelve-month period to October, 1964, were:

Farm C.

Costs	£	s.	*Returns*	£	s.
Valuation change—breeding herd	832	10	Sales and closing valuation of calves	9,510	2
Concentrates	1,834	7	Subsidies	1,349	16
Roughages	614	5			
Pea haulm silage and pressed beet pulp	1,126	16			
Grazing (fertilizer and fencing)	1,288	10			
Miscellaneous	215	0			
GROSS MARGIN	4,948	10			
	10,859	18		10,859	18
Fixed costs directly chargeable to herd	4,059	16			
Profit (gross margin *less* fixed costs)	888	14			

The gross margin is given for comparison with the sheep flocks, but in fact the rent, wage bill and interest payments were specific to the beef herd, which was a self-contained unit. Thus there are two ways of interpreting the results. On the one hand, the gross margin of £22 per acre can be compared

with those from the sheep flocks. On the other hand, since the tenant had to pay the specific (fixed) charges mentioned above, the actual gain to him in terms of cheaper stores was reduced to the £890 shown as profit.

These three example farms demonstrate some of the possibilities of grassland in an arable area. The two sheep enterprises show gross margins per acre at least equivalent to cereal production: one by the intelligent use of by-products, the other by taking advantage of the high prices obtainable for pedigree ram lambs. Although the beef herd did not reach these levels, it nevertheless provided an unusually high return from permanent grassland. With improved management, the stocking rate during the current period has been increased to nearly one cow per acre and a reduction made in concentrate usage, which should further increase the potential of the enterprise.

C. A. Wagstaff has been a Livestock Husbandry Officer in the N.A.A.S. since its inception in 1946. For the past eight years he has served in Suffolk, but he has now been moved to Shropshire on promotion.

Sonia Kurta and **B. Gyrth Jackson** are both research officers in the Farm Economics Branch of the School of Agriculture, Cambridge University. The former is studying the economics of beef production and the latter has recently conducted surveys of sheep flocks in the Eastern Counties.

White Papers on–

• The Development of Agriculture
• Marketing of Meat and Livestock

On 4th August, 1965, the Minister of Agriculture, Fisheries and Food presented two White Papers to the House of Commons and made a statement about them. He said that the first White Paper marked an important step forward in the Government's plans for the development of agriculture over the longer term, and explained that it contained proposals for improving the size, layout and equipment of farms, for developing the rural economy in the hills and uplands, and for encouraging co-operation among farmers.

The Minister also spoke about the second White Paper, which deals with the Meat and Livestock Commission, and said that the Paper set out the Government's conclusions, after discussions with the main organizations concerned, on how the marketing of meat and livestock should be improved.

In both cases it is intended that the necessary legislation will be introduced as soon as possible.

The White Papers are:

(a) The Development of Agriculture. Cmnd. 2738. H.M.S.O. 1*s.* 3*d.* (by post 1*s.* 6*d.*)

(b) Marketing of Meat and Livestock. Cmnd. 2737. H.M.S.O. 9*d.* (by post 1*s.*)

Leicester

Described by R. Scott

as a good red cheese comparable, when of first quality, to any other cheese including Stilton

---

YET another of the regional cheeses of England which has survived the passage of time is Leicester. This cheese and Stilton have gone hand in hand for many years. The cheese has been manufactured in the area about the rivers Soar, Wreake and Nene from milk produced on the famous Leicestershire and Northamptonshire pastures and water meadows. Some of this land overlies ironstone deposits and most of it is kept in a state of high fertility.

The breeds of cattle normally kept in this area were mainly of Shorthorn type, with perhaps a preponderance of beefy cows. The milk produced usually had a softer curd than that, for instance, from Derbyshire or Somerset pastures, and its acidity (expressed as lactic acid) was lower than in these other milks—very suitable therefore for making both Leicester and Stilton cheese.

First-quality Leicester cheese will take pride of place with any other cheese (including Stilton), but unfortunately it suffers from so many defective flavours, textures and colours that really prime cheeses are scarce. Attempts to eradicate some of these faults by technological aid and practices, like pasteurization of the milk or using larger quantities of starter, may in themselves produce undesirable qualities.

Of all cheeses, Leicester is the most highly-coloured; and the more highly-coloured it is, the better the market and the higher the price. Indeed, before 1939 Leicester cheese of prime quality commanded the highest price of any cheese.

The traditional Leicester cheese is 20 in. in diameter, 5–7 in. deep and weighs 45–50 lb, but present-day Leicester cheeses are usually smaller than this. The cheese is edible at six weeks but it is not properly ripe till three to four months—although the cheese may be over-ripe at nine months. When cut, it should show a fine rind and a deep red-yellow colour. The texture is slightly open and free from gas holes. The body when ripe should be firm, mellow, almost spreadable and buttery. The flavour should be clean, free from taints or sourness, but have a slight piquant acid taste when fully ripe.

The curd is compressed into blocks, then repeatedly cut

Farmhouse Leicester cheese, formerly from the Leicester–Northampton areas, has been made at only one farmhouse in recent years; most of it is now made in factories concerned with Stiltons located in the Melton Mowbray area and in creameries in the south-west of England.

The recipe for Leicester cheese has become stabilized as a result of keeping the variety alive at Dairy Schools and other training institutes. But for this help and encouragement at local agricultural shows, the variety might well have died out. No white Leicesters have been made for many years, but smaller cheeses, 10 in. in diameter and 3–4 in. deep, are marketed in plastic film. Small 1, 2 and 4-lb cheeses, similar to Leicester but called Kingston cheese, have been produced.

Leicester is one of the most difficult of all cheeses to make satisfactorily. A medium acid-producing culture (butter culture—not more than $\frac{3}{4}$ per cent) is used for starter. The starter must be well mixed before adding the annatto at a rate of 7–10 oz per 100 gallons of milk. Rennet at the rate of 4–6 oz per 100 gallons of milk is added at 84°F. The rate of adding annatto and rennet depends on the individual cheesemaker, who may need to vary the quantities according to conditions and the time of the year. Great care is necessary in renneting, since over-stirring will cause loss of fat, and fat rising to the surface may cause mottling in the cheese. After 45 minutes the curd is cut with fine-bladed knives until the curd particles are of the size of wheat. Scalding is carried out at 98–100°F until the curd is 'shotty' to the touch.

The curd is compressed into blocks which are repeatedly cut with knives until it is dried out and shows an acidity of from 0·45 per cent in spring to 0·65 per cent in summer. The fine mill (as for Cheshire cheese) is used and, after salting, the curd is cooled to 74°F before being pressed into shape. Pressing is carried out for two days, with a final pressure of 25–30 cwt (10–15 cwt in the case of small cheeses). It is essential to turn the cheese regularly during the first period of ripening.

Leicester cheese usually loses 10–15 per cent moisture during the first six weeks, but if the loss of moisture is excessive the surface will crack. Hence the practice of coating the cheese bandage with paraffin wax to prevent evaporation and damage by mites. Draughts in the storage room are very troublesome, and these too produce cracks in the cheese coat.

Average Acidities for Leicester Cheese Manufacture

Stage	% Acidity (mls N/9 NaOH)	Time Hr	Min
Adding starter	0·155	0	0
Renneting	0·185	0	45
Cutting	0·125	1	30
Running whey	0·18	2	35
Milling	0·45–0·65	4	30

Logically, Leicester is one of those cheeses which should have disappeared in the course of time, but in spite of the difficulties the overriding quality of prime cheese has been its saving grace.

Its high colour is a disadvantage, since small defects of physical or bacterial origin cause bleaching and mottling. Damage to curd by squeezing out fat causes mottled curds in the ripened cheese. The curd is tender, and fluctuating temperature may cause wheying off with subsequent bleaching of colour. The cheese is one of the sweetest of hard cheese, and since the amount of lactic acid produced as a preservative is low, the growth of undesirable organisms is not held in check and gives rise to many taints. Antibiotics (e.g., penicillin) in the milk, chlorine, detergents or traces of metals (e.g., copper) from milking equipment may all cause difficulties in manufacture. Thus there may be more second-quality cheese produced than is economically bearable.

Leicester cheese can be produced in rindless block form in film packaging material, provided due care is taken during manufacture to keep the moisture content low. While the cheese so produced is satisfactory and very pleasantly edible, it is a rather different product from that we knew before the war. As with most other cheeses, the general public does not remember the quality of pre-war Leicester, and hence finds these cheeses extremely palatable. Indeed, attempts to introduce to the younger generation the prime quality cheese so sought after by the old-time connoisseurs have failed; young people find it too strong.

We are, then, left with the task of keeping alive interest in those regional cheeses, like Leicester and Gloucester, as very desirable additions to our diet in spite of difficulties in their production.

Certain parts of the country have preferences for either highly-spiced or highly-flavoured products, and in this way Leicestershire acclaims a 'good red cheese'. In fact, coloured cheeses of any variety are preferred to white.

32. North Montgomeryshire

Clive Scott

THE area where one works and lives usually appears to the 'locals' as rather special and unique. North Montgomeryshire is just that! It is nearly 100,000 acres in area and has a complete variation of soil, rainfall, climate and, of course, people.

The area borders Merionethshire to the west—close to the point which tenth century Welsh law-maker, Hywel Dda, chose as one of the arbitration centres for his three sons who were to rule the three kingdoms of Wales. To the north lies the Denbighshire border and the highest point in Montgomeryshire—over 2,700 feet. At the eastern boundary we have Offa's Dyke and the English gentlemen of Shropshire.

Altitude and rainfall reduce rapidly as the traveller moves from west to east. This results in a wide range of farming from pure mountain farms to intensive lowland dairy and arable holdings. Soils also vary but are mostly derived from Ordovician or Silurian shales and grits. The River Vyrnwy runs through the district and joins the Severn near the Shropshire border. At the confluence of the two rivers is an area of rich farmland that is subject to severe flooding.

Beautifully situated in the midst of the western hill area is Lake Vyrnwy. The eleven miles road around the lake is often 'nose to tail' with cars at the weekend. The lake probably causes the only traffic jam in Montgomeryshire, apart from Welshpool market on a Monday! The construction of the Vyrnwy works was started in 1881. By 1891 the $4\frac{3}{4}$ mile long and $\frac{1}{2}$ mile wide lake—the largest artificial reservoir in Europe at the time—was completed. The masonry dam across the natural valley of the Afon Vyrnwy was the first high-masonry dam in Great Britain. Over 50 million gallons of water a day are sent directly by pipe some 68 miles to Liverpool.

The area around the lake typifies the mountain farms of the district. They are fairly large and carry, in the main, flocks of Welsh Mountain ewes which produce store lambs, draft ewes and a wool clip. The other main enterprise is a single-suckled herd of Welsh Black or Hereford cattle, which produces weanling cattle for sale in the autumn or store beasts for sale in the following spring. The unbalance of lowland and hill presents many

problems; for this and many other reasons—apart from a rainfall of up to 100 inches per year—a fairly considerable quantity of hay is brought into the area from the Midlands. Labour is a problem in this very rural area, and this is perhaps another reason to encourage more farmers to buy in 'good acres' in the form of hay.

A few more progressive farmers are housing ewes and ewe lambs; ewes to increase overall stocking rate and to have greater control at lambing time, and ewe lambs to combat the rising prices and often poor quality 'away tack' wintering on the lowland farms.

The hills are often difficult to improve as they are sometimes inaccessible and have a very high lime and phosphate deficiency. Inoculation and lime/phosphate coating or clover has been tried on the New Zealand pattern to speed up improvement on the hill using minimum quantities of fertilizers. Results so far are encouraging.

On these slopes the effects of podsolization are evident, and podsol gleys and podzolic soils are to be found. Areas of deep peat are common on the higher plateaux. Forestry is interspersed with agriculture and there are some 7,000 acres of State and privately-owned woodland in this hill area. Larch is to be found mainly on the rocky, poor, and exposed dry land. Sitka and Norway spruce is planted on the wet land—the former on the exposed slopes and the latter in the valley frost hollows. Douglas fir is also very common and is one of the most popular species on the more fertile slopes.

As the traveller moves east from the true hill farm, the altitude drops to 600–900 feet and the rainfall to around 45 inches. Here is found the marginal stock-rearing farm with some dairying. These farmers are dependent to some extent on their hill neighbours to the west for draft ewes and, to a lesser degree, for store cattle. The cattle enterprise is generally double or multiple suckling, selling eighteen-month-old stores. The progressive farmer in this central area is, like his neighbours on both sides, trying to intensify, and this is generally by the increase of the ewe flock. The winter period is the problem; the precision seed driller and the swede crop is, however, coming to the rescue. Very little labour is required for the crop, and it provides a good cheap food for the in-lamb ewe from January-February onwards. It is often followed by a crop of grazing rye for ewes and lambs.

To the east of the district the intensive dairy and corn farms are to be found. The altitude, rainfall and soils are far kinder than in the west. The rate of capital expenditure over the last few years has been considerable; yards, cubicles and parlours are sprouting up like mushrooms everywhere. An especially tall tower silo is dwarfed only by Admiral Rodney's pillar built on the crest of the Breidden Hills. The average size of farm is around 50 acres, and the use of nitrogen and paddock grazing is helping the progressive farmer to squeeze as many cows as possible on to that acreage.

There is virtually no industry in the area, apart from small sawmills which supply the local community with hand-made trailers and cattle mangers. The lack of industry has resulted in great de-population of the area, but in days gone by there were small fulling mills and the scars of old lead mines are still to be seen. One fairly large quarry still thrives and even exports natural green chippings. If you happen to be reading this in a foreign country, the green chippings at your feet could well have come from picturesque North Montgomeryshire.

F. E. BURR
Agricultural Land Service, Truro

Combined sheep and cattle handling units

How many man-hours are spent handling cattle and sheep? How much of this time could be saved through the provision of properly designed facilities?

There are about 9½ million breeding ewes in England and Wales and, of these, about 219,000 are in Cornwall. There are over ½ million breeding cows and heifers, about 23,000 of them in Cornwall. A well-managed ewe flock may need to be handled 15 times during the year, and a herd of breeding cows 4 times. Thus the true significance of the handling pens may be realized.

The handling arrangements on two Cornish farms are good examples of what can be achieved. The first farm is that of Messrs. W. E. and D. T. Cave, at Roughtor, Bodmin Moor, and the second is one of the Duchy of Cornwall Estate farms, Pawton Farm (Manor of Pawton) near Wadebridge, occupied by Mr. R. G. Nightingale.

Messrs. W. E. and D. T. Cave have realized the importance of providing labour-saving arrangements. Besides rough grazing, the farm has about 500 acres of permanent grass and carries 1,600 Welsh Half-bred ewes, 200 ewe hoggs and 60 breeding cows and heifers of mixed breeds, principally Welsh Black. These livestock are looked after by a manager and two men; no casual labour is employed.

The pens are used for the sheep throughout the year. Injections are done in early March, drenching in April/May, and shearing and separation of ewes and lambs in June. Spraying is carried out two or three times during July/August, and sorting of fat lambs and miscellaneous 'bunching-up' of ewes for grazing and foot-bath treatment three or four times during the year. The pens are also used for the cattle; sorting, drenching, the annual Tuberculin Test, and weighing calves before sending away to sales in October/November.

Fig. 1 shows the principal features of this layout, which includes a special cattle 'splitter gate' and New Zealand 'drop-over gates' for sheep. The 'splitter gate' has the advantage that splitting or sorting is positively controlled, and can be carried out quickly or slowly. There is no fear of an animal escaping with the gate closed, and there is little danger of injury against the end of the gate in the half-open position. The 'drop-over gate' for sheep is much easier to handle than other types of gate, and is easily

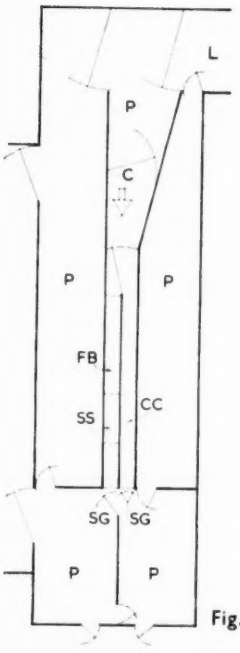


Fig. 1

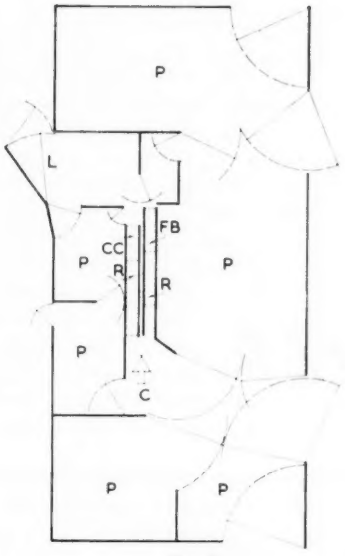


Fig. 2

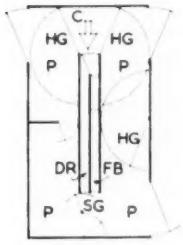


Fig. 3

C. Crush
CC. Cattle crush and weighing
FB. Foot-bath
R. Race
DR. Drafting race
SS. Sheep spray
SG. Splitter gate
HG. Hosking gate
P. Pen
L. Loading

constructed. This gate is used in the sheep race and also in catching pens adjoining the shearing floor.

A feature of the pens is the combined spray race and foot-bath. This has the advantage that sheep get accustomed to the race, and can be made to pass through it easily.

Mr. R. G. Nightingale has provided stock-handling pens on open concrete adjoining a covered yard. The layout is shown in Fig. 2 and was designed primarily for cattle, but simple additions have made it also suitable for handling sheep. Besides the usual sorting arrangements for cattle,there are weighing facilities and high-level loading. The sheep section includes 'drop-over gates', splitter gates, spray race and foot-bath.

Mr. Nightingale, who fattens one hundred 18-month-old cattle in the building over the winter, considers equipment of this kind fully justified. In particular, the provision of the weighing machine is essential for checking liveweight gain at the end of each month's feeding.

The patented 'Hosking' gate, which was used in the sheep demonstration pens at the Royal Cornwall Show in 1964 (Fig. 3), can very often provide the key to an efficient layout. This gate can be used equally well to open or close in two directions. It can be moved through the special hanging post when change of direction is required without disturbing the animals, even if pens are full. In this way there is a saving in space and greater flexibility in the use of the pens. These gates may also be used for cattle, and are simply operated by one man. One farmer in Cornwall personally dosed and individually sprayed 610 sheep in $2\frac{1}{2}$ hours. Handling was aided by the 'Hosking' gate and a dog; without these gates at least two men would have been required.

An operation carried out up to fifteen times a year certainly warrants careful consideration. The saving in labour will quickly repay the capital cost of providing suitable equipment.

IN BRIEF

New grants for more small farmers

In the Annual Review White Paper 1965 the Government announced its intention to extend the Small Farmer Scheme and to relate it more directly to the improvement of farm business management. A Scheme giving effect to this decision has now been approved by Parliament. As a result, small farmers who carry out an approved farm management programme over a period of three years (which will include keeping farm records) will get grants up to a maximum of £1,000.

The new Scheme, which came into operation on 1st September, 1965, provides for payment of a general farm management grant of £150 plus £8 10*s*. per acre on up to 100 acres of crops and grass. The Scheme is limited to small farms of between 20 and 125 acres of crops and grass with labour requirements of between 250 and 600 standard man-days. The schedule of standard man-days has been revised and the new upper limit is equivalent to 700 man-days on the old scale.

The old Scheme provided for payment of a farm business grant of £6 per acre for up to 60 acres of crops and grass and field husbandry grants for approved operations such as ploughing, reclamation and ditching; total grant might not exceed £1,000. The Scheme was limited to farms falling between 20 and 100 acres of crops and grass with labour requirements of between 250 and 500 standard man-days.

Applications under the old Scheme could have been submitted up to 31st August, 1965. However, farmers who were eligible under the old Scheme but who are not eligible under the new Scheme, because of the change of standard man-day values, are allowed until 15th November, 1965, to apply. Farmers who were eligible under the old Scheme but whose labour requirements are only just above the minimum level of 250 standard man-days are advised to contact the Ministry's Divisional Office quickly if they wish to qualify for assistance.

It is estimated that 36,500 farms in England, Wales and Northern Ireland will be eligible under the Scheme and that the total cost over the life of the Scheme will be £20 million.

Farm buildings insurance

Most farmers automatically insure their farm buildings. Those who feel that they cannot afford the modest premium (which is usually about 3*s*. per £100) certainly cannot afford to make good the total or partial loss of an important building.

In the last four years losses have gone up by about 70 per cent in value according to one source. How many people revised their policies at the beginning of this

period and have not done so since? Replacement costs may not have risen as much as 70 per cent in four years but they have risen by a significant amount and this should be reflected in the insurance cover.

There has been some improvement lately in assessment of 'full value' by landowners but a large measure of under-insurance still persists. For example, a building insured for £2,000 recently burnt almost to the ground (for the second time in 40 years) and cost around £7,000 to replace with some improvements in design but not in capacity. Even if the building had been repairable, the insurance cover would have been insufficient. Another building, destroyed in its second year, cost over £200 more to replace than the original and in addition there were site clearance and surveyors' fees. A redundant or otherwise useless building may reasonably be left uninsured; but one that is necessary for farming should be covered for the full cost of replacement in new modern construction including site work and fees. It is, of course, quite unnecessary to insure a traditional building for its cost in similar materials if modern materials are much cheaper, unless it is considered essential for amenity and the owner fully intends to rebuild in the event of a loss.

Do you know what your buildings might cost to replace individually? It is probably more than you think so why not get a surveyor in rural practice to estimate them for you to get up to date? A percentage should be added each year until it is time for another review. Do not forget to add new buildings.

An insurance broker can best advise you about the type of cover available and the pitfalls of exclusions and conditions. On the whole, maximum cover is desirable. The cost is relatively small yet the unforeseen and uninsured hazard could mean ruin. The bad weather in 1962 and 1963 resulted in a great many claims for damage from the insured. What happened to the uninsured?

Care should be taken to avoid claims arising and so help to keep down the premium rates for all. Have fire extinguishers available, keep roofs secure, do not replace metal water piping with plastic without making sure that the electrical circuit has an alternative earth. Attention to minor details often prevents a major loss.

Remember that it is an advantage to have a common renewal date for all the insurance policies for an estate or farm. This simplifies the regular review of policies and enables the total cost of insurance to be easily seen and considered.

P. S. de Mattos

Home-Grown Cereals Authority—bonus payments and levies

The Agricultural Ministers recently approved a Scheme for bonus payments on forward contracts submitted to them by the Home-Grown Cereals Authority. The Scheme provides for bonus payments to growers of wheat and barley at the rate of 10*s.* a ton on forward contracts fulfilled in any of the months December, 1965, to June, 1966. The Scheme has been made by the Authority under Section 2 of the Cereals Marketing Act 1965. A forward contract under the Act is a contract where there is at least one clear calendar month between signature and delivery.

An Order was laid before Parliament on 1st July, 1965, imposing levies on growers of wheat and barley in the cereal year 1st July, 1965, to 30th June, 1966, to finance the operations of the Home-Grown Cereals Authority. The levies, which will be collected by deduction from the cereal deficiency payments, are at the rate of 1·7*d.* per cwt on wheat and 2*s.* 2*d.* an acre on barley. It is estimated that the levies will produce a total of £1,175,000.

The Home-Grown Cereals Authority was set up on 3rd June, 1965, under the Cereals Marketing Act 1965. The address of the Authority is Ingram House, 13-15 John Adam Street, Adelphi, London, W.C.2, and its General Manager is Mr. J. W. Pugsley.

Slatted floor systems for pigs

The Farm Buildings Unit of the Agricultural Research Council has recently published Occasional Paper No. 2: Slatted Floor Systems for Pigs, by P. H. Easton and P. N. Harvey, which is a review of research literature on the subject up to 31st December, 1964.

The first trials of slatted floor systems were reported from Norway and the U.S.A. ten years ago. Since then the results of more than fifty other investigations have appeared in a wide variety of journals, papers and reports. The A.R.C.'s publication reviews this literature and summarizes and compares its findings.

The publication is mainly concerned with slatted floors for fattening pigs, but trials of slatted floors for farrowing crates and for early-weaned pigs are also reported. Aspects of the system reviewed include the design and construction of floors, manure storage and disposal, environmental conditions in slatted floor piggeries, floor space allowances, pig performance, and the labour requirements and economics of the system.

'Slatted Floor Systems for Pigs' is obtainable from H.M. Stationery Office, price 2*s.* 6*d.* (by post 2*s.* 11*d.*)

Standard tyre sizes for agricultural machinery

The British Standards Institution has recently published Part 2 of British Standard 3486: *Wheels for agricultural machinery, implements and trailers.* Part 2 deals with *Tyre and rim sizes.* Published as part of what will ultimately be a comprehensive standard covering every aspect of wheel standardization for agricultural machinery, it establishes a limited, national range of wheel diameters and rim sizes.

It is hoped that the preparation of this standard will help to reduce the immense variety of wheels now in use on farm equipment, and so encourage implement manufacturers to base their designs on the standard range.

The new publication specifies tyre and rim sizes for wheels up to 28 inches in diameter, and includes the minimum data necessary for identification purposes.

Part 1 of B.S. 3486 (wheel and hub centre dimensions) was published in 1962. A third part to this standard is planned and will deal with wheel studs and nuts.

Part 2 of B.S. 3486 is obtainable from British Standards Institution, 2 Park Street, London, W.1, price 3*s.* plus postage.

Plant diseases

The plant health regulations, which safeguard the health of the country's trees and plants against injurious insects or diseases which might enter Great Britain from abroad, have been brought up to date. A joint Order revising the regulations was recently made by the Minister of Agriculture, Fisheries and Food and the Secretary of State for Scotland, and came into operation on 15th September, 1965.

Imports of plants, lucerne seed and certain raw fruit and raw vegetables are all affected by the changes, some tightening up and others relaxing existing restrictions. The separate regulations governing the importation of potatoes are unaffected.

Books

The Common Liver Fluke. E. M. PANTELOURIS. Pergamon Press. 80*s*.

This book brings together the major part of the extensive literature on *Fasciola hepatica* in a series of chapters which consider the biology, structure and physiology of the fluke; its chemotherapy and immunology, its ecology and control. There is some discussion on the need for, and the direction of, future research and appendices on the handling of liver fluke material and the preparation and fractionation of liver fluke antigens.

In a work which ranges widely in highly specialized fields, it is clearly impossible for the author always to speak with complete authority. In those fields where I have special knowledge, there are many instances where information derived from the literature does not seem to have been examined in sufficiently critical detail. In other cases it appears that a misunderstanding of the literature has led to error. Thus, when considering the life history of the liver fluke, the author suggests that a redia gives rise to several daughter rediae, each one of which repeats the process, growing and producing a further generation of rediae. This account of the life history would find little support from those who have worked with it. Further, it is suggested that the cercariae leave the snail through the pulmonary cavity and by rupture of the mantle wall, a view which is not in accordance with the only authoritative account of the process published in recent years.

There are also some ambiguities which could cause mistakes, e.g., the Table on p. 25 refers to *F. gigantica* as well as to *F. hepatica* and the mesh sizes as quoted on p. 35 are incomprehensible.

Printing and production of the book are excellent; the text is clear and usually free from errors. Some small points need special mention. For instance, I found myself continually irritated by the use of 'cercarium' (plural cercaria) which is sufficiently unusual to merit an explanation.

In brief, this is an excellent review of the literature, but it is not a wholly authoritative monograph. It may seem rather expensive but it supplies a great deal of information not readily obtained elsewhere.

S.B.K.

An Introduction to Agricultural Chemistry (3rd Edition). Revised by J. S. WILLCOX and W. N. TOWNSEND. Edward Arnold. 28*s*.

The first edition of this book was published in 1947. As both previous editions were reprinted, it has clearly appealed to a wide audience. Its title provides some clue to its success; the book has been conscientiously and cleverly planned to provide an introduction to much of the diverse field covered by the term 'agricultural chemistry'.

Part I, on Soil and Fertility, describes the mineral composition and nutrient status of soils and incorporates a section on fertilizers, which were treated in previous editions in a separate section. Part II deals with Animal Nutrition and discusses the composition of the animal and its food, with particular reference to metabolism and to the nutritive value of different foodstuffs. The basic knowledge of chemistry required to read Part I is no greater than most students would possess from an 'A' level course at school. A wider knowledge of organic chemistry is inevitably required to understand the structure and metabolism of proteins and carbohydrates. One of the many virtues of this book is that it provides an introduction to the organic chemistry of these substances without assuming readers already possess it.

The authors state in their preface that the sections on soils and fertilizers were integrated 'to emphasize the fact that fertilizers are designed to supplement plant nutrient elements already present in the soil'. The intention is admirable but the treatment fails in places to show how greatly, and for how long, the nutrient supply from soils can be modified by the repeated application of farmyard manure or PK fertilizers. The statement on page 66 '. . . it is not possible to build up a reserve of phosphate in the soil . . .' has been refuted by field experiments in many parts of the world. There are several other minor inaccuracies. For example,

in Table 7, the percentage of N in ammonium nitrate-limestone is given as 15·5, whereas it is now much more usually 21–23 per cent.

The book is, nevertheless, an invaluable introduction to the subject for students and a useful source for occasional reference by more senior workers. Both would be helped, however, if each chapter had a brief but well-chosen bibliography. The printers and publishers deserve much credit for making available so well-produced a work at such a reasonable price, and it would not surprise me if further editions appear in the future.

G.E.G.M.

Handbuch der Pflanzenphysiologie : Encyclopedia of Plant Physiology. Vol. 15. Differentiation and Development. Parts 1 and 2. W. RUHLAND (ed.); SPRINGER-VERLAG, Berlin, Heidelberg and New York. $187.

The *Encyclopedia of Plant Physiology*, published in eighteen volumes, is an ambitious attempt to provide a comprehensive review of the science through the medium of a large number of distinguished authors, each of whom provides a paper on his own subject. Number fifteen is by far the largest of the volumes, being published in two parts which contain between them more than three thousand pages and contributions from more than seventy authors. When one considers that the subject of this volume, 'Differentiation and Development', is very closely related to those of Volumes 14 and 16 entitled, 'Growth and Growth Substances' and 'External Factors affecting Growth and Development' respectively, one obtains some idea of the exhaustive nature of the enterprise.

Part 1 starts with a series of papers discussing genetical and cytological aspects of development and differentiation in plants, and emphasizes the links now being created between the two sciences of Genetics and Developmental Physiology. It continues with a number of aspects of the latter, such as polarity, embryogenesis and the role of the apical meristem, the significance of water supply, osmotic relations and nutrition on development. Finally, Part 1 includes papers on the growth and development of organs such as roots, shoots and leaves, with papers of particular concern to those interested in applied aspects, on juvenile and adult forms in woody plants, and the physiology of flower initiation and fruit development.

In general the papers contained in Part 2 have more direct interest to the applied physiologist. They cover a range of subjects of particular import to horticulturists, such as the regeneration of organs, and the effects of environment and physiological condition on bud and root formation, and the regulatory effects of plant hormones on the rooting of cuttings of stems, leaves and roots. The occurrence and significance of inhibitors is discussed fully both in relation to the natural dormancy of whole plants and to parts of plants such as potato tubers, gladioli corms and seeds. Methods of breaking or avoiding dormancy are discussed, together with a series of papers dealing with all aspects of seed germination and storage.

As one has every right to expect with two books costing between them over £60, the presentation, the quality of plates and figures, and the indexing are first class so that, in spite of its size, the volume is easy to explore and its information is readily obtainable. The papers are published in English, German and French, with the first two greatly predominating in approximately equal proportions. This means, in the absence of reciprocal summaries in each language, that a good knowledge of all three languages is required for full use of the information contained.

From the foregoing it is clear that this work will serve its most useful function as a reference book, and for this purpose the extent of the bibliographies included at the end of each paper will certainly be almost as helpful as the papers themselves. This is essentially a manual for those concerned with research into problems of developmental plant physiology, both fundamental and applied, and to a lesser extent, it is a source of most useful basic information to anyone called upon to give advice on problems related to physiology. On the other hand it is most emphatically not the sort of book which would represent a good investment on the bookshelf of a grower or a farmer concerned with 'grass root' physiology and for whom most of the relevant information published in this book is available in a more easily digestible form.

P.A.T.

Catalogue of Lewis's Medical, Scientific and Technical Lending Library. H. K. LEWIS.

The previous edition of this work was published in 1957, with a supplement in 1960 including books published up to December, 1959. The appearance of a new edition is most welcome, as it is a source-book of 33,000 important books in the broad subject fields of medicine, science and technology, all of which are in current demand. The expansion of the library—now some 120,000 volumes—to keep pace with the continuing 'explosion' of published information, has necessitated the printing of the catalogue in two volumes.

The first caters for an author approach, and comprises an alphabetical list of authors and titles of books, with details of edition, size, price and date. Where the original place of publication is outside Britain, this is stated (an indication of viewpoint, or emphasis).

The second volume facilitates a subject approach to the various fields. Subjects are listed in alphabetical order and under each is an alphabetical array of names of authors who have written books upon it. This is in the press and will be supplied later in the year.

Apart from serving its primary purpose as a guide to an immense store-house of current literature which is available on loan for a very reasonable subscription, this catalogue has long been recognized as a valuable comprehensive bibliography in its subject fields.

It is kept up to date by bi-monthly supplements available from the publishers; nine of these must already be searched, as the latest publication date of titles in the catalogue is December, 1963. It is unfortunate that so much time has had to elapse between compilation and publication, but with a work of this kind, typesetting and proof reading tend to be lengthy operations. To agricultural readers, the separately published *Catalogue of books on agriculture, horticulture, animal husbandry and veterinary science*, published in May, 1964, is a useful supplement to the full library catalogue: copies are available free on request to H. K. Lewis and Co. Ltd., P.O. Box 66, 136 Gower Street, London, W.C.1.

The price of the catalogue (2 parts complete) is £1 10*s.* to library subscribers and £2 15*s.* to non-subscribers.

F.C.H.

Identification of Flowering Plant Families. P. H. DAVIS and J. CULLEN. Oliver and Boyd. 12*s.* 6*d.*

The book provides a key for identifying the families of flowering plants that are native or cultivated in the Northern Hemisphere, and is intended primarily for students of agriculture, botany, forestry and horticulture. Although designed as a pocket-book to be used in the field, it will probably be of most value in the laboratory, where it can be supplemented with the other publications which would enable the genus and species also to be identified. It is unlikely that a botany student would be content to identify only the family to which a plant belongs, and it is not clear what practical value this would have in agriculture, forestry or horticulture.

Apart from this limitation, the book contains much information presented in a concise manner. The first section includes detailed explanations of the various technical terms used by the authors when referring to floral structure, and is illustrated by six pages of line-drawings. The second section tells the reader how to examine the vegetative and floral characters of an unknown flowering plant. These instructions should be particularly helpful to any student inexperienced in plant identification. Instructions then follow for using the key which forms the main part of the book. The key is easy to use, and is subdivided into a series of group-keys which provide for the identification of 260 families. A further section is devoted to short descriptions of the families and, finally, there is a glossary of terms, as well as some references to important taxonomic literature.

C.E.Q.

The Soils of the West Midlands. D. MACKNEY and C. P. BURNHAM. 25*s.*

This second bulletin of the Soil Survey of Great Britain gives a good but necessarily generalized account of the soils of the counties of Cheshire, Shropshire, Staffordshire, Herefordshire, Worcestershire and Warwickshire. It includes chapters on soil forming processes, the description of soil profiles and their characters, the characters, occurrence and agricultural properties of West Midland soils and details of twenty soil associations found in the area. There are also appendices giving brief accounts of local soil series

and a list of soil surveys (many unpublished and of a reconnaissance nature) used as basic data. Accompanying the book is a coloured map on the scale of 10 miles to 1 inch showing the approximate distribution of the twenty soil associations described in the text.

It is important to realize that a soil association is an area in which different soils occur in some characteristic pattern or sequence, usually in relation to landscape, and a particularly valuable feature of *The Soils of the West Midlands* is a number of block diagrams showing the typical relationship of soils to topography. At the same time, within a soil association there may be soils of very diverse agricultural properties, e.g., association 1 includes the light, freely-drained Newport series widely used for arable farming and the poorly-drained Wem series used for mixed farming. In the introduction the authors state 'It should be noted that the map does not aim to give information about the soils on particular fields or farms, for which detailed maps are needed; in the West Midlands such maps are available for the Wem district of Shropshire (Crompton and Osmond, 1954) the Church Stretton district of Shropshire (Mackney and Burnham, 1964) and the Vale of Evesham (Osmond *et al.* 1949)'. Advisers, farmers and other users of the map must, therefore, only expect pointers as to the range of soils to be expected in any particular district, although this in itself is often valuable information.

The standard of printing and reproduction of photographs, diagrams and the map are of a very high quality.

Copies may be obtained from the Librarian, Rothamsted Experimental Station, Harpenden, Herts. (Extra copies of the map 5*s*.)

W.D.

Books Received

Ask the Fellows who Cut the Hay. George Ewart Evans. Faber and Faber. (Paperback Edition) 10*s*. 6*d*.

Farm Business Statistics for South East England. (Supplement for 1965). 3*s*. 6*d*. (inc. postage) from The Secretary, Department of Agricultural Economics, Wye College (University of London), Ashford, Kent.

Farm Guide 1965. Norfolk Agricultural Station, Sprowston, Norwich.

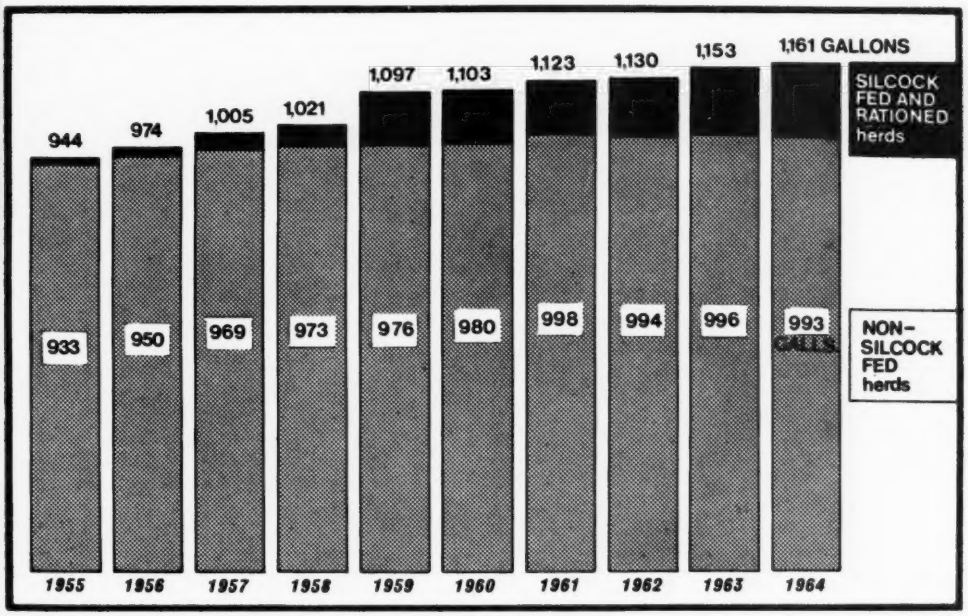
ACKNOWLEDGMENT OF PHOTOGRAPHS

We gratefully acknowledge permission to use the following photographs:

P. 422 V. H. Beynon. P. 424 Marion Martin. Pp. 432 and 433 East Malling Research Station. P. 435 John Topham Ltd. P. 436 A. Eden. Pp. 443, 445, 446 and 449 *Farmer's Weekly*. P. 453 Fox Photos Ltd. P. 460 R. Scott.

Printed in England for Her Majesty's Stationery Office
by Hull Printers Limited, Willerby, Hull, Yorks.

(K120) 72-1-65-9



Graph based on National Milk Records Reports, issued by the M.M.B.

Who *are* these dairy farmers whose herds year after year show consistently higher yields and higher butterfat than the others?

Like you, they own good stock and are good stockmen. Fourteen per cent of them were new to the Silcock system at the beginning of 1964, and in their first year improved their yields both of milk and butterfat. All of them used Silcocks—either the celebrated H.Y. range or the 'Dairy' brands.

Silcocks

R. SILCOCK & SONS LTD, STANLEY HALL, LIVERPOOL 3

industrialised buildings

FOR YOUR FARM IMPROVEMENT SCHEME

The **Agrecon Concrete Building System** uses large-scale production of a range of well-designed units, giving remarkable economy without sacrificing almost unlimited flexibility of layout. As in the case of the building illustrated, design and layout can be suited to your particular needs. With this you will also have the advantages of **low initial cost, quick erection, no maintenance charges,** and a solid practical structure which will last more than a lifetime.

If you are considering farm improvement, now is the time to discuss your ideas with us. We shall be pleased to give you a free quotation, which normally includes for foundations and complete building erection.

AGRECON **CONCRETE BUILDINGS**

LOW INITIAL COST — NO MAINTENANCE CHARGES

am interested in:

- ☐ **COVERED CATTLE YARDS**
- ☐ **HAY BARNS**
- ☐ **COWSHEDS**
- ☐ **MILKING PARLOURS**
- ☐ **SILAGE BUILDINGS**
- ☐ **STORES**
- ☐ **GENERAL PURPOSE**

Please send full literature for AGRECON BUILDINGS.
Please ask representative to call.
(Tick where applicable)

Name .....

Address .....

.....

..... Phone No. .....

POST TODAY to: **CONCRETE UTILITIES LTD., DEPT. A/9, WARE, HERTS,** or to any of our works, quoting reference letters.

WORKS AT WARE, LIVERPOOL, CRAMLINGTON NEW TOWN, COLEFORD, (GLOUCS).

LIVERPOOL Kirkby Industrial Estate. Simonswood 2887/8.

NEWCASTLE Cramlington New Town. Cramlington 272.

COLEFORD Broadwell, nr Coleford, Gloucs. Coleford 3369.